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AVIATION

The Oldest American Aeronautical Magazine

Rate of Growth OF THE INDUSTRY

Two Way Radio DEVELOPMENT

Why THEY *Spin* THE WAY THEY DO

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AVIATION

The Oldest American Aeronautical Magazine

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COMING

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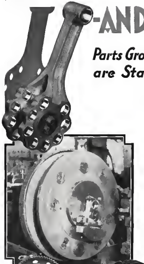

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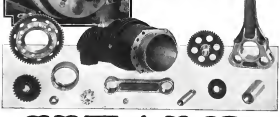

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6. Distance of 1000 kilometers at 152.702 miles per hour

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AVIATION

THE OLDEST AMERICAN AERONAUTICAL MAGAZINE

A McGraw-Hill Publication Established 1916

EDWARD P WARNER, Editor

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"Warning—Don't Land Here!"

UPON the editorial desk there lie a number of documents There is an issue of the little leaflet entitled "Notices to Mariners" published every few days by the Hydrographic Office of the Navy Department. There is a recent copy of the Air Commerce Bulletin issued by the Aeronautics Branch. There is a pile of loose sheets circulated by the British Air Ministry under the collective title of "Notices to Air Men,—Navigational Warnings."

The Hydrographic Office information for seamen appears in pamphlet form, but with the items so arranged that they can readily be cut apart and pasted into the light lists and coast pilots which are the coastal navigators' bibles

The Air Ministry segregates its navigational warnings, up which every cross-country pilot should inform himself, from its miscellaneous information by printing them on pink paper instead of blue Each notice stands out as a separate item, with its own heading upon a separate sheet, and there is no excuse for overlooking it In the pile that we are examining at the moment all of them issued in the last year, there are announcements that a flying meeting is about to be held at Lympne airdrome on a specified date and that aircraft proceeding to that field during that period should therefore use special care, that there is a temporarily dangerous area near the middle of the Antwerp field and that it is marked with a single red flag that Littlestone landing ground is temporarily flooded and very soft, and that special care should be used in making landings, that the flood light at Croyden will be out of action on a specified evening, owing to a change of the wiring system, and that Royal Air Force planes will be flying at night during a specified period and over a specified region, carrying on military practices during which no navigational lights will be shown

The Department of Commerce does it somewhat differently The Air Commerce Bulletin is a pamphlet of some thirty pages appearing semi-monthly It contains reports of addresses by the personnel of the Branch miscellaneous advice for pilots, explanations of the Department's attitude towards glider operations, statistical data upon the progress of air navigation, lists of approved type certificates issued, lists of hypothetical or proposed airports, and a section entitled "Airport and Airway Changes" Within that last section there appear, with no separate descriptive headlines and with only the faintest evidence of the division of the several items, a miscellany of information about new airports, airport changes, lighting, radio operations, and corrections to be made on charts

We cast our vote for the British system The information needed by the pilot or navigator should be segregated from the mass of diverse material with which the Air Commerce Bulletin intermingles it. Its nature should be plainly indicated in big bold type. There should be no opportunity for the pilot whose machine does not happen to be equipped with communicating apparatus to run his eye down a list of items heavily dotted with such terms as "kilocycle," exclaim "Nothing but a lot of radio bunk!" and so overlook the highly pertinent announcement that the field where he is planning to land tomorrow is temporarily unfit for use

We may be in the publishing business, but we have no connection with the type-founding industry. Only the purest altruism and a desire to see the pilot get all the information that is available for him moves us in our plea for more use of red ink, sixteen-point bold-face

heads, and separate inserts on colored paper, if not a completely separate and extensively cross-indexed publication, when modification and elisions of air navigation facilities have to be announced

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Military Accessories

ONE of the most important of the factors contributing to the practical development of the modern airplane in all its many ramifications has been the work of the specialty and accessory manufacturers Whether in adapting a material or product previously used in other industries to an aeronautical application, or whether in the development of an entirely new technical mechanism the specialty manufacturers have successfully responded

This has been brought about in many cases by the assembling and developing of highly specialized engineering forces peculiarly well versed in aeronautical requirements The problems successfully solved in both a technical and production sense have in most instances been applicable alike to military and commercial aircraft In some cases it has been the spur of an overestimate of anticipated commercial expansion that has led these organizations on to their present highly developed technical resources For these specialty organizations, in the light of the recent slowing up of aircraft production, to reduce, to abandon, or to divert to other channels these highly skilled engineering organizations would occasion an irreparable loss to aviation as a whole

There is a field of activity inseparably linked with aviation to which their skill might well be diverted for a time to the mutual advantage of all interested activities There is a vast class of specialized aeronautical equipment commonly referred to as military accessories The development of such military adjuncts as aerial bomb and torpedo installations, gun mounts and gun sights, gun cameras, trigger controls, etc are military details of major importance, whose development is often in the first instance a charge upon corps or bureaus only cooperatively associated with those directly charged with the fostering of military aviation

Progress in the field of military aeronautical accessories has often been to some extent handicapped by the division of responsibility and authority It is believed that much might be gained by defining the fundamental military requirements and then enlisting on a larger scale than heretofore the cooperation of these skilled specialty organizations, some of whom at least temporarily have time to spare At the very minimum, a distinct gain in the applicability of details to modern production facilities and processes should be the consequence Government laboratories and research bureaus are splendid agencies for the development of fundamental ideas, but they are not, by their very nature and equipment, suited to the adaptation of their fundamental discoveries to the most modern detail production practice Yet it is often the failure of a comparatively insignificant detail that brings about the abandonment of an otherwise promising development

The present situation appears to provide a splendid opportunity to better correlate technical military development with the most advanced production possibilities Much might be gained in efficiency by "cleaning up" production details on military accessories in this way, at the same time providing new potential sources of supply for military accessories in time of national emergencies Finally, such activity would provide a logical method of holding intact these splendid engineering organizations through the present disturbed period in commercial aviation

//

Laboratory Tests

OF THE USEFULNESS and importance of laboratory test work in modern aeronautical development, little need be said here Almost without exception, the progressive airplane manufacturer either conducts research and test work in an organized department, in a corner of his shop as occasion demands, or submits certain construction or material to a professional laboratory When such tests are initiated to establish the suitability of a material or fabricated unit already agreed upon for a specific application in a given model, the authorization and procedure are relatively simple The tested product is either satisfactory, may be modified to be satisfactory, or is rejected

When, however, the tests verge more on general applications bordering on true research, the problem is more complex Then the question of comparison of results arises, and it is necessary so to control the tests that results are directly comparable

A paint tested today may give certain results when boiled in gasoline and after a sixty-day exposure test One tested a year from today by boiling in water and exposure for 120 days, will likewise afford certain conclusions But the two are not directly comparable, and when such tests run into a considerable number in the course of years, with the possibilities of many other variable factors in addition to those mentioned, no satisfactorily scientific basis has been provided for drawing a final conclusion as to which is most suitable

Similar difficulties occur in structural tests One type of beam construction may be tested in a 12-foot section 8 inches deep, another in a 20-foot section 12 inches deep No matter how painstakingly the findings are collated, the result is seldom conclusive

Standardized procurement tests are a step in the right

direction,—much can be gained by their natural extension Their range however is decidedly limited—the major part of laboratory test activity falls outside their scope

A start can be made within any single organization by an initial check of test results already available in the records, first to determine the actual desirability of the contemplated test and second to compare the methods with those previously employed Obvious as this may seem changing personnel, mergers, and cycles of technical popularity often occasion tests when the desired facts might have been reasonably predicted from previous experience or established by only one or two minor tests instead of a complete investigation

The definition of the procedure for laboratory tests is one of the few fields of engineering activity where originality is not at a premium Where a test procedure has already been established for a particular class of test, it should be followed in subsequent tests and deviated from only with the best of reason Variations in procedure may appear highly advantageous on rapid scrutiny, but they may also entirely eliminate all value from the particular test as a recorded base for future general comparisons

Besides adhering to past procedure in the home organization, reference should also be made to existing government test procedures and to private results upon which reports are publicly available By a little forethought, and by the simple expedient of following an established test procedure, a particular material or fabricated unit may be automatically made a part of an extensive comparative research already available Given proper executive encouragement, a great deal of research work can be profitably performed in the library, thereby not only saving unnecessary costs but also clearing the decks for really essential test activity.

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Is Flying "Learned" or "Taught"?

IT IS PRESUMABLY the object of the aircraft industry, or at least of that part of it most anxious to sell airplanes to private owners, to make flying easy and unexciting The operation of aircraft does not come within the reach of the multitude until the multitude is convinced that it does so So long as the operation of an airplane appears to stand among special and extraordinary manual skills, not to be explained but to be acquired only by careful observation of an expert and gradual absorption of his technique, aviation cannot be popular The giving of flying instruction is a branch of aviation, but it is also a branch of education, and it is far more the latter than the former

There is no place in a flying school, and fortunately at least a goodly share of the well-organized schools realize it, for the expert pilot who has nothing to offer except his expertness If you have to choose between two men, one a transport pilot with ten years' experience and with no understanding of educational methods and no inherent sympathy with the difficulty of beginners, the other a private pilot with ten hours solo but a real teacher either by native instinct or by practice acquired in teaching French or arithmetic the second can in six months' time be made a much better flying instructor than the first

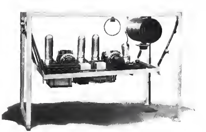
We foresee with concern that at this point we stand condemned in the eyes of many of our readers The impatient have already flung the magazine aside with the indignant assertion "They'd like to make pilots a bunch of highbrows" Educational theory" is a forbidding phrase.

To relieve the doubters we hastily assure them that we have no idea of limiting the teaching of flying to graduates of the Harvard School of Education Good teachers are born much more often than they are made, and we have known pilots although unfortunately not very many of them, who never had graduated from high school but who knew more about the fundamentals of education and about how to present an idea in simple and easily retained form than ninety per cent of the professors in any college

There are two essentials First, the operations of flying must be co-ordinated There must be some central philosophy The student must see what he is trying to learn as a whole and not as a collection of disconnected maneuvers to be performed according to as many separate rituals Second, there must be some rational explanation of the landing of an airplane, some connection between the theory and the practice that the student can easily grasp and remember and some logical technique expressible in words Most present-day pilots have learned to land a machine by receiving the vaguest possible description of the process and then going into the air with their instructor to watch what he does and try and reproduce his actions for themselves afterwards Having played the rôle of student with a goodly number of instructors, we can number on the fingers of one hand those who have had any direct and comprehensible description of the landing process to offer or any standardized and simple trick for uniformly accomplishing a good landing Those who have not had wit enough to devise anything of the sort for themselves may be furnished with it by a school manual, but those who have worked it out on their own account have proclaimed themselves competent teachers

There ought to be far more discussion of teaching methods in the aviation industry than there is at present There ought to be more articles written upon that subject Teaching ought not to be a side-line to anything else whatever, and the men who can really teach are far too precious an asset to aeronautical development to be spared for any other pursuit

T. A. T.-MADDUX *Two-Way Radio* COMMUNICATION



The one unit radio set developed by Mr Proctor and now used on T.A.T planes

A Review of the Troubles Encountered in the Development of the System that is Giving Real Service on the Company's Lines

By G. E. Everett
Assistant General Traffic Manager
Transcontinental Air Transport, Inc

WITHIN two weeks following the inauguration of T A T coast to coast passenger service six of the radio transmitters arced over to such an extent that the insulation caught fire and was burned to the crispness of well fried bacon Each time the fire was extinguished without damage except to the transmitter and to the confidence of the passengers But each time it became more serious; each time it was emphasized that the aircraft radio which a leading radio corporation produced was a dismal failure as far as the T A T line was concerned.

Thorough tests were made of all the component parts to discover, if possible the fundamental weakness E W Proctor, T.A T radio engineer, and engineers of the radio company made repeated trips with the transmitters and other tests were made on the ground

A number of weaknesses were discovered and attempts were made by the radio company to remedy them none of which were successful Fundamentally, the error had been in failing to accurately calculate the electrical stresses which various units must endure Other errors lay in the method of design, construction and installation

Mr. Proctor compiled the various weaknesses of the transmitter somewhat as follows (1) complexity of design. (2) Multiplicity of parts (3) Inaccessibility (4) Poor insulation of parts (5) Improper calculation of electrical stresses. (6) Little attention given to the needs of aircraft transmitters

In each of the six cases of fire aboard the planes inspection disclosed insulation burned to a crisp in the power amplifier coil—caused, Mr Proctor believed, by electrical currents arcing across the terminals or between the terminals and the outside metal of the case

In a few cases, insulation of the various relays, collapsed under the heavy load carried and burned in addition to the amplifier coil The tube sockets arced across in still other cases, the terminals failing to carry the 1,050 volts The tubes and sockets naturally were ruined.

All in all, T.A T. had no radio transmitter. Much

E. W Proctor, T.A.T. radio engineer, "at the phone" aboard a T.A.T. plane

favorable publicity had attended the inauguration of the service and one of the features of the line emphasized was the two-way radio communication Advertising likewise had emphasized the radio feature all in good faith, of course but there actually was no radio transmitter.

WHEN the sixth transmitter burned without apparent ability on the part of the radio company to remedy the condition the problem was placed squarely on the shoulders of Mr. Proctor He had supervised the installation of the radio equipment of planes of N A T., sister company of T A T and had assisted with numerous experiments in the Bureau of Standards

First of all, Mr. Proctor took a detailed inventory of the parts used in the radio company's offering He found it to consist primarily of four units as follows:

(1) Oscillator unit (2) Potentiometer. (3) Loading coil (4) Dynamotor for power supply. Subdividing the units further he itemized their component parts thus

Oscillating Unit (1) Power amplifier coil (2) Oscillator coil. (3) Four vacuum tubes (three UV211 and 1 UX210). (4) Two chokes with resistances varying from 2 to 35,000 ohms (5) Two relays (6) Seven condensers with capacities varying from 1 MFD to 0.000015 MFD (7) One pickup coil and thermocouple (8) Two grid leaks

Potentiometer Unit (1) Eight resistors varying from 2 to 35.000 ohms (2) Three multiple contact relays (3) Two filter condensers (0.002 MFD) (4) Two modulation transformers (5) One transformer used as filter choke (6) Six circuit test jacks

Loading Coil Unit. This unit was in effect a tapped variometer the stator of which was 6¼ in in diameter and 14 in long. It was housed in a box 16x11¾x10¾ in and weighed 13 lb

Dynamotor Unit. The dynamotor with its starting panel weighed slightly over 33 lb.

With the usual accessories including microphones. control boxes, antenna and antenna reels, fair leads. keys, wiring and control cables the transmitter alone weighed 165 lb —more than the weight of the average passenger!

Because of its weight and bulky arrangement. it was necessary to make the installation in the forward part of the passenger cabin utilizing the space intended for one more chair In other words carrying space for one passenger was sacrificed to the radio transmitter In fact, the space of the chair was not sufficient to house the transmitter In that space was only the oscillator and loading coil units. the fair lead, the antenna reel and the shock mounting

In the pilot's cockpit mounted under his seat were the remote control for the antenna reel (which did not operate) two electrical remote control boxes and on the sides of the cockpit were two microphones and two keys Parts of the receiver also were mounted in the cockpit the remainder being in the rear of the fuselage behind the passenger cabin

Mr Proctor assisted by Daniel L. Givens, assistant T A T radio engineer, dismantled several transmitters and using the original parts wherever possible, went at their redesigning problem The scene of the activities was first at Lambert Field St Louis Mo. and later at Glendale Field California At each place the demand was "Simplify and condense Eliminate parts and weight"

IT WAS day and night for several weeks At the outset Mr. Proctor had well in mind the fundamentals that must be injected into the set The circuit to be used was the same as the commercial set had embodied, namely, the master oscillator—power amplifier circuit But it must be done with less than half the original parts and must be mounted on a compact panel easily accessible

Parts were cast aside ruthlessly It began when five relays weighing two pounds each were removed. The loading coil was cut in half Taps and switches were removed. The two modulation transformers were removed and one of greater efficiency and less weight substituted All boxes and cases in which the original set was housed were eliminated

The result. as finally designed and now installed on all T A T -Maddux planes is illustrated in the accompanying photograph The circuit remains as before—master oscillator—power amplifier and the tubes are as before—three UV211 and one UX210 Otherwise nothing remains of the original set which our courier had to treat so often with the Pyrene.

The new set has been designed to consist of only one unit; it is installed on one removable panel hung on shock absorbers in the rear of the fuselage away from passenger interference and the passenger space formerly occupied by the transmitter has been returned to use by passengers

The transmitter itself weighs only 29 lb and with

power supply and all installation and operation accessories installed for remote control, it weighs but 85 lb Fuses have been used to protect all the circuits and a five-point irreversible plug makes all the necessary connections to the transmitter including the ground The entire set may be removed and another installed within three minutes even by a person not familiar with radio apparatus

The three UV211 tubes serve as oscillator modifier and power amplifier and the one UX210 serves as a speech amplifier or microphone tube The output is 100 watts The necessary 1,000-volt plate supply is obtained either from an engine driven generator or a battery driven dynamotor In either case a current of approximately 500 mils is drawn and distributed as follows: Modulator 190 mils, oscillator 85 mils, power amplifier 230 mils

THE TRANSMITTER is remotely controlled from the pilot's cockpit approximately 30 ft away A test button, however has been installed near the transmitter to facilitate tests

Only one meter is permanently mounted on the transmitter This is a radio frequency ammeter in the antenna circuit and usually indicates a radiation of from 4 0 to 4 25 amperes There is, however, one other meter as part of the radio equipment This is a very small galvanometer on the pilot's instrument board A two-inch loop of wire mounted near the antenna loading inductance picks up sufficient energy to actuate this meter which gives the pilot the visual assurance that everything is in order For maintenance work and testing on the ground, elaborate plug-in test equipment is used which provides complete information relative to the condition of each circuit

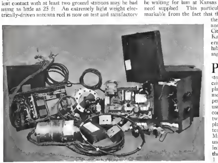
As this airplane transmitter operates on frequencies ranging between 500 and 1,100 meters a trailing wire type of antenna is necessary A length of 175 ft is used in normal service and no resonance difficulties are ever experienced due to its fixed nature Nevertheless excellent contact with at least two ground stations may be had using as little as 25 ft An extremely light weight electrically-driven antenna reel is now on test and satisfactory results are indicated In the event of a forced landing, two-way contacts are always made with the T A T ground stations by stringing up the antenna on the glass insulators and bamboo pole carried in the tail of the plane

BEARING IN MIND the fact that T A T.-Maddux flies approximately 7,000 miles every day in the regular transport of air passengers, it is surprising to note that only one of its new transmitters has failed during the past six months That failure was of one of the parts of the original transmitter and used again in the redesigned transmitter Although the airports are in the order of 225 miles apart, a plane in flight may always be sure of communicating with at least two ground stations Absolutely continuous two-way communication is often obtained to 700 miles through considerable static, and 1,250 to 1,300 miles have been accomplished under favorable atmospheric conditions The operator at Kingman, Ariz, recently reported that a westbound pilot on the Eastern Division gave his position as 20 miles east of Columbia, Mo Better measure this airline distance on a map

A number of extraordinary uses have been discovered for the two-way radio of T A T -Maddux in addition to its strictly operating functions It, of course, has been an important part of the weather bureau, pilots being warned aloft of impending weather conditions ahead Pilots have been ordered to turn around while in flight because of operating or traffic emergencies

As another example of two-way radio, the writer was called from bed early one Sunday morning to be informed a passenger aboard the eastbound plane had radioed a request that he be met for a short interview at Lambert Field at noon The reply likewise was radioed to the passenger who received his reply aloft between Waynoka, Okla., and Wichita and the appointment was kept

At another time a photographic fan aboard a westbound plane exhausted his supply of film between St Louis and Kansas City A request that additional film be waiting for him at Kansas City was radioed and the need supplied This particular example is more remarkable from the fact that the pilot aloft had to radio the request to Waynoka and and have it relayed to Kansas City by teletype because the Kansas City station is a government station and prohibited from handling messages of that nature



Showing the amount of radio equipment originally installed aboard T-A-T planes

PASSENGERS wired their brokers during the last stock market break and received replies aboard the planes, business appointments have been made repeatedly all in addition to the usual burden of necessary company communication between ground stations and planes aloft It is perhaps interesting to note that T A T -Maddux radio equipment is used 90 per cent for weather information, 9 per cent for the company's business, and 1 per cent for the convenience of the passengers

Rate of Growth
OF THE AIRCRAFT INDUSTRY

By ROBERT R. DOANE

The rate of growth of the American aeronautical industry is a subject that has been discussed pro and con many times since Lindbergh took off for Paris. Some people argue that the rate of growth of the aircraft industry has been considerably greater than the growth of the automobile industry in the early days. Others contend that there is no basis of comparison between the old and the new transportation industries. ¶In this article Mr. Doane treats that subject in a most interesting way and brings out many facts that should be of value to our readers.

MUCH as we might want to believe certain things to be true, as they are related to that branch of human endeavor in which we may happen to be engaged, yet from the standpoint of rational fact we are brought to remember that any industry, regardless of its character, when entering the economic structure soon establishes a rate of growth characteristic of itself and which is in more or less equilibrium with the ability and desire of the entire economy to receive it

In any economic series where reliable data is available over a period of years it is a relatively easy matter to find a "trend" or rate which will give us some sort of perspective on the industry in question, as well as to serve as a basis of reasonable expectation in the future The figures themselves, as they tabulate the final periodic results, are nothing more than the embodiment of the combined engineering, manufacturing promotional, financial and educational skill and force behind the program of the enterprise In such a method of cold calculation the elimination of *bias* is achieved and a rational basis for future calculation is established What such an approach may accomplish, lies in the fact that it tells the story in terms of *results* only, without optimism or pessimism, and with a minimum of delusion for all who may be interested As this has been the method commonly employed in measuring other industries it would seem not without reason to employ it in the aircraft industry

IN ALL SUCH long term measurements due allowances must be made for fluctuating conditions both internal and external to the industry In some years technological improvements creating an accelerated demand will naturally cause the volume to exceed the normal rate of growth, while in other years unfavorable factors may be expected to operate in the opposite direction Therefore the estimates, as shown in Table I reproduced here, are based upon an average "normal" year.

As estimates for any five years are more likely to agree with actual totals than is an estimate for any single year a five year average is employed The five year method is long enough to include changes in technological advance and further avoids the undue influence of abnormal years; also a five year period comprises, usually, at least one complete business cycle The estimates in Table I are based on an average annual rate of 40 per cent, whereas by actual computation, as observed in the accompanying Table II, we find the average annual rate to be 34 67 per cent By eliminating the war period (1916, 1917 and1918) through moving forward the line of production, as illustrated in Chart 1, and by the fitting

of a free-hand curve as preferred by some statisticians of wide experience (The Problems of Business Forecasting, by Warren M Persons Business Cycles, The Problem and Its Setting, Wesley C Mitchell) we obtain a remarkable similarity to the rate of growth of the automobile industry (40 per cent per annum) as established over the first nineteen years of its experience

It is evident from this brief examination of the facts that long-time prediction of trends is likely to be as inaccurate as it would be unwise But for purposes of short-time prediction (five year average period) we can compute the present normal in comparison with the normal of past years with a reasonable degree of accuracy

In so doing for the next few years the percentage variation above or below the normal expectancy is any one's guess, with those leaders of the industry in possession of intimate month-by-month figures being in an advantageous position to forecast with great accuracy the course of the immediate future The difference in results lying in the adequacy of the statistics at hand and the way in which they are used

CHART 2 illustrates graphically the rate of total aircraft production from 1909 to 1930 The heavy black line running diagonally across the chart in the center of the dotted line represents the normal rate of growth, and is moving forward at the rate of 34 67 per cent per year Between the first two dotted lines marked *B* and *B'*, which gives a range of 60 per cent (30 per cent above, and 30 per cent below normal), may be considered as the *"zone of probability"* Between lines *A* and *A'* a much larger percentage variation is allowed for This range may be fairly called the *"zone of possibility"* Under normal trade conditions the movement will in all likelihood, fluctuate between the lines *B* and *B'*.

When viewed over a period of years, as in the automobile industry, the development of aviation has been very recent, and as also with the automobile industry the rates of increase are incomparable with the past experience of any other industrial series, unless it be the very early development of the railroads According to Dr Carl Snyder, (Business Cycles and Business Measurements, by Carl Snyder, p 37-41) of the Federal Reserve Bank of New York, from 1900 to 1905 automobile production increased 38 per cent per year, 47 per cent per year from 1905 to 1910, 35 per cent per year from 1910 to 1915, and 18 per cent per year from 1915 to 1920 Since 1920 the normal rate has declined to about 5 per cent per year This represents a stupendous development of a new industry, in fact the most outstanding growth with the single exception of the aircraft industry which bids well to exceed the automobile rate

The accompanying Table III of comparative rates of growth may be of interest as it includes the basic industries of America with their early, middle and more recent rates of increase It will be noticed that in practically all trends the rate of growth is normally small with a 10 per cent rate exceptionally large and of recent years even 5 per cent standing above the average

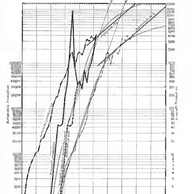
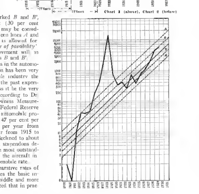


Chart 1 (above), Chart 2 (below)



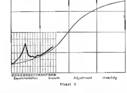


Chart 3

In any study of the rate of growth it is well to consider the so-called 'Law of Growth' as originally outlined by Dr Raymond B Prescott ("Law of Growth in Forecasting Demand,' Journal of the American Statistical Association, December, 1922, vol xviii, pp 471-479) He suggests that all industries, whose growth depends directly or indirectly upon the ability of the people to consume or in some way utilize their products, pass through similar phases in the course of their development These four stages seem to be common

1 Period of experimentation 2 Period of growth into the social and economic fabric, 3 Through the point where growth increases but at a diminishing rate, 4 Period of stability

ON THIS BASIS, Dr Prescott suggests that the trends of all industries may be represented by a single type curve—that yielded by the Gompertz equation Every industry, he states, may have a different rate of growth, because no two industries have the same combination of influences They will, however, trace the same type of curve, even though the rate of growth is different If this is true, and there is ample evidence that it is, the aircraft industry is obviously just entering on its second stage (period of growth into the social and economic fabric) and as may be observed from a glance at the Law of Growth Curve (Chart 3) should continue to expand for at least the next decade at a rate which is considerably in excess of its established average.

Table I.

Normal Aircraft Production Table

(Based on variations from the average rate 1909–1929)

Years	Normal 40 Per Cent (1)	*Decrescent 2 Per Cent per Year (2)	Decrescent 4 Per Cent per Year (3)	Decrescent 10 and 5 Per Cent (4)
1929	6 084	6 084	6,084	6,084
1930	8,510	8 396	8 474	7,909
1931	11,925	11 419	10 790	9 491
1932	16 603	15 301	15 811	10 440
1933	21,373	20,197	17,126	10 067 (5%)
1934	32,722	26 256	20,331	11,510 (5%)
1935	45 811	33 608	23 039	12 086

*Showing an annual increase but at a diminishing rate

(1) Average rate of growth established over twenty year period.

(2) Showing annual increase but at a 2% diminishing rate

(3) Showing annual increase but at a 4% diminishing rate

(4) Showing annual increase but at a 10% diminishing rate over next three years, thence proceeding at 5% diminishing rate

Table III.

Comparative Rates of Growth

Series	—Average Rate of Annual Increase— Early Period Per Cent	Middle Period Per Cent	Later Period Per Cent
*Aircraft Production	88	68	
Motor Truck Production	78	60	8
Passenger Automobile	38	47	5
Railroad Building	25	14	1 2
Steel Production	15	10	3
Petroleum Production	14	28	8
Railway Freight Traffic	14	7	5 5
Pig Iron Production	11	6	3
Bituminous Coal Production	10	2	5
Average Rate Total Production All Lines	3 8	5 8	3 8
Population Growth	2 3	2 3	2 3
Bank Deposits Rate of Increase	7	7	7

*Elimination of years 1916 1917, 1918 gives rate of increase during first period at approximately 88% Rate over past five-year period, 1924–1929 68% Rate over entire twenty year period, as shown in Chart 1 is 34 67%

Table II.

Method of Calculating Rate of Growth

Year	Yearly Total	Beginning Period		Ending Period	
1909	1	1909	1	1924	377
1910	0	1910	0	1925	789
1911	11	1911	11 = A'	1926	1 186 = B'
1912	45	1912	45	1927	1 995
1913	43	1913	43	1928	4,346
		5)	100	5)	8 693
			20 = A		1 738 = B
1914	49				
1915	178	Average centered for Year 1911 at 11		Average centered for Year 1926 at 1 186	
1916	411				
1917	2,148				
1918	14 011				

(B) 1 738 divided by (A) 20 = 8 690% (C)

(A') 1911 minus (B') 1926 = 15 years (C)

1919	780	
1920	328	
1921	437	Upon reference to Compound Accumulation Table (below)
1922	263	a growth of 8,690% (C) in 15 years (C) is equivalent to an
1923	743	annual rate of 34 7% (D)

Projective

1924	377	Basic year (B)	1926 = 1 738 (B)
1925	789	Next year	1927 = 2,346 (B = 34 7% (D))
1926	1,186	Next year	1928 = 3 167 (B = 34 7% (D))
1927	1 995	Next year	1929 = 5,273 (B = 34 7% (D))
1928	4 346	Next year	1930 = 7 121 (B = 34 7% (D))

Compound Accumulation Table

Years	34 5%	34 6%	34 63%	34 66%	34 67%	35%	38%
1	134 50	134 60	134 65	134 66	134 67	135	138
2	180 90	181 17	181 30	181 33	181 36	182	190
3	243 31	243 85	244 12	244 17	244 23	246	262
4	327 25	328 22	328 70	328 79	328 30	337	362
5	440 15	441 78	442 58	442 74	442 92	448	500
6	592 00	594 63	595 94	596 19	596 46	605	690
7	796 24	800 37	802 43	802 82	803 27	817	952
8	1 070 94	1 077 20	1,080 47	1,081 07	1,081 76	1 103	1 313
9	1 440 41	1 450 03	1,454 85	1,455 76	1 456 80	1 489	1,812
10	1 937 35	1 951 74	1,958 95	1,960 32	1,961 87	2 010	2,500
11	2,605 73	2 627 04	2,637 72	2,650 76	2,647 05	2,713	3,450
12	3 504 70	3 533 88	3 551 60	3 554 70	3 538 04	3,663	4,761
13	4 713 82	4 759 44	4 782 33	4 786 81	4 791 61	4 945	6 570
14	6,340 08	6,406 20	6,439 40	6,445 01	6 452 96	6 676	9 067
15	8 527 40	8 622 74	8 670 65	8 680 06	8 600 06	9 014	12,253

WHY THEY *Spin* THE WAY THEY DO

Fig. IV. There is no rational reason why anyone would want to spin this amphibion yet it will unquestionably be done at times

An Account of the Spinning Characteristics of Several Airplanes Based on Flight Tests

By P. E. Hovgard
Keystone Aircraft Corporation

ANY AIRPLANE that can be made to fall off into a spin should have some means provided for recovery after it has spun a turn, regardless of the size or type of plane. If the plane is of such size and type that it is liable to be spun frequently for student instruction to lose altitude or any other purpose, recovery should be rapid, even after a prolonged spin. Although the spinning requirements of the Army, Navy, and Department of Commerce vary slightly, they are essentially the same and are much more definite and stringent than the other flight characteristics of the airplane. It is a trick of fate that those requirements should be most definite about which the known means of remedy are the least definite.

In most cases the spin goes flat only after four to six turns of a normal spin. As the plane picks up speed in the spin, the inertia forces increase, producing a positive pitching moment. If this moment is greater than the negative pitching moment produced by the tail the angle of attack of the airplane increases until it reaches a region of stable autorotation or the flat spin. The difference between the normal and flat spins for an airplane may be so small that it is recognized only by a reversal of pressure on the stick when held in the rear position, or may be so great, that although recovery from a normal spin is rapid, the recovery from a flat spin is impossible, either because the controls are ineffective, or because the pilot passes out, due to dizziness and acceleration.

There are two methods of attack to the spin problem, to eliminate the flat spin, and to control it. Many factors that will tend to eliminate the flat spin have no effect at all on the recovery from, or control of a spin after it has gone flat. Again one is prone to leave too small a margin, so that any small change in rigging, or a little overweight may cause the plane to spin flat again. Rain has the same effect on an airplane as going into production, or bringing out the next model—it gets slower heavier, the center of gravity moves to the rear, reducing the longitudinal stability, and the spins get worse. Even though the margin may appear to be quite large, a small change in weight and center of gravity position may make a great difference in spins.

ON THE OTHER HAND anything that makes a flat spin more controllable, either by reducing the moments due to autorotation, or by providing a more positive righting moment to oppose the autorotation, is effective when the spin is at its worst, and variations in weight or balance have but very little effect on the recovery. By properly balancing the elevators, the back pressure is very small. Although the Department of Commerce Airworthiness Requirements state that there shall be no back pressure on the stick an airplane will be licensed if the back pressure is small and the recovery rapid.

For airplanes which will be spun often and are in the class required to be spun for the Department of Commerce the second method is more logical. An airplane may be out of that class however, so that it may be licensed without being spun. To consider one's design a success because it can be licensed is analagous to considering one's son a success because he at present is not in jail. Since by the first method the chances of entering a normal spin inadvertantly are reduced and the airplane will go flat only after a prolonged spin with the stick held back after being overloaded or put into production, this method is the better for a certain class.

The main factors determining the characteristics of a spin are:

(1) Static weight of the airplane.

(2) Inertia force of the horizontal component of the helix described by the center of gravity.

(3) Inertia forces caused by the rotation of the airplane about its center of gravity.

(4) Aerodynamic resistance of the airplane to translation.

(5) Pitching, rolling, and yawing moments about the center of gravity due to the aerodynamic properties of the airplane rotating about the axis of the spin.

THESE FIVE FACTORS, clearly defined as they may be, are so interwoven in the actual development of a spin, that it is impossible to segregate them for separate study. The factors must balance each other—if one is lacking, the others must be improved to make up, and they must all be above a certain minimum. This minimum is not yet known, and in some cases one even wonders which way is up.

The greatest part of the tests was made on a two place training plane, convertible land plane and single float seaplane, built for the Navy as shown in Fig. I. As a land plane it went flat during the fourth turn, and recovered after holding full down elevator and full reverse rudder for four turns. As a seaplane, the figures remain nearly the same, but the rate of rotation was much greater. The purpose of the tests was to determine the changes necessary to eliminate the dangerous spinning characteristics. One would much rather start with a good spinning airplane, and try to find what makes it bad, than vice-versa—it is like trying to pour water through a funnel backwards.

Since the primary force behind the spin is the weight of the airplane, it is obvious that the heavier the plane, the worse the spin. Tests were made in which the total weight was varied as well as the position of the center of gravity without changes in moments of inertia. In one case an increase in weight of 100 lb. in a landplane, all placed within a radius of 12 in. of the center of gravity, caused the airplane to reach its critical point in the spin, and go flat, increasing the time required for recovery from three quarters to three and one quarter turns. In a seaplane that already spun flat, the same ballast increased the time for recovery from three and a half to five turns.

The position of the center of gravity is important in reducing the tendency to go flat, but will not materially aid recovery from a flat spin. The weight of the airplane acting at the center of gravity with the lift of the airplane produce a couple tending to rotate the airplane about an axis close to the axis of pitch. The centrifugal force of the airplane acting horizontally, tending to increase the radius of the helix and the aerodynamic reaction produce another couple about the same axis. With a forward position of the center of gravity, the stalling moment is reduced and in some cases will prevent or delay the flat spin.

Tests were first made on the effect of the center of gravity position on the airplane with the engine 15 in.

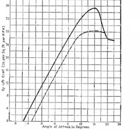


Fig. III. The lift curve with the flat top (broken line) spun much better than the other

Fig. I. This very normal appearing training plane proved to have a very wicked spin

Fig. II. This plane was expected to have a slow recovery but it was impossible to keep it in a spin

to the rear of the original position—thus concentrating the weight along the fuselage as much as possible The center of gravity position was changed by the use of sweepback It was assumed the effect of sweepback on the spin to be comparable to its effect in normal flight producing the same results as dihedral Tests were later made with changes in dihedral

Tests were started with the center of gravity at 39 per cent of the mean chord, and moved forward in four stages to 26 per cent As it was moved forward, entrance into the normal spin became more and more difficult The airplane reached the critical point during the fourth turn, and the time required for recovery was five turns, regardless of the center of gravity position

The most talked about cause for flat spins is a precessional moment The mass distribution is, no doubt, a large factor in a spin, but the precessional moment falls far short of being a satisfactory explanation of the flat spin There can be no doubt, but that there is a force couple caused by the rotation of the airplane about its

Fig. V Various adaptations of a Frise type aileron

center of gravity These tests, however, indicate that this couple is only a small factor in the determination of the character of the spin

Tests have already been mentioned on the effect of a change in center of gravity location on an airplane with the engine moved to the rear For one of these tests the airplane was spun without ballast in the rear The center of gravity was then at 28 per cent; recovery required four turns In the original airplane with long engine mount, the center of gravity at 28 per cent, and no ballast in the rear, the spin could not be made to go flat

Throughout the tests changes in wing cellule ailerons and tail surfaces were more effective on the airplane with the long engine mount One commercial manufacturer solved his spin problems, and obtained an Approved Type Certificate for his airplane by moving his engine forward, and no other change No definite reason for this can be given, and the only explanation one can suggest is, that the comparative concentration of weights along the fuselage allows the axis of rotation to vary its position relative to the airplane

Fig II shows an airplane very similar in type and performance. The upper wing was moved forward after the photograph was taken, bringing the center of gravity when flown for flight training to 30 per cent Every difference between the two models is one which according to popular theory should make the airplane spin worse—less stagger less gap shorter fuselage, but with identical horizontal tail, and higher terminal velocity Also the calculated value of $I_{zz} - I_{xx}$ (a value comparable to the stalling couple) was 15 per cent higher

In the first place the spin was very difficult to start due, most likely to the very small dihedral After it did fall off, it spun very rapidly for four full turns, the rate of rotation increasing as the spin developed During the fifth turn the nose came up quite suddenly—and the plane was in a flat spiral The precessional moment had virtually pushed the spin out the side door A small commercial airplane was later found with very nearly the same spinning characteristics The center of gravity in this airplane was back at 38 per cent It owed its phenomenal recovery, however to a stagger-decalage cellule

Eliminating the upper aileron entirely from the upper wing, and building in the wing as shown in the airplane in Fig VI, prevented the flat spin entirely in the airplane with the long engine mount, but made no difference in the airplane with the short engine mount and with sweepback This is not a problem in aileron design, but in mass distribution indicating that the weights along the span must be concentrated relative to the weights along the fuselage

Further tests were then made, placing ballast at various positions inside the pontoon, in the tail of the fuselage, in the engine mount, in center section, and at the wing tips Tests were all made with the same gross weight of the airplane, and the same center of gravity position The value $I_{zz} - I_{xx}$ was taken to represent the precessional moment, and $I_{zz} + I_{xx} - I_{yy}$ comparable to the weights along the span For a given value of $I_{zz} - I_{xx}$ and reducing $I_{zz} + I_{xx} - I_{yy}$ the tendency to flat spin was reduced, and when carried far enough eliminated the flat spin, but does not reduce the time required for recovery from a flat spin For a given value of $I_{zz} + I_{xx} - I_{yy}$ and reducing $I_{zz} - I_{xx}$ the flat spin became steeper, and recovery more rapid, but there was no tendency for the flat spin to be eliminated

A twin float seaplane has a lower value of both $I_{zz} - I_{xx}$ and $I_{zz} + I_{xx} - I_{yy}$ than a landplane, and, therefore, would be expected to spin better Reports of spin tests on commercial twin float seaplanes are not at present available, but until they are made, one can be optimistic of their results A single float seaplane has a higher value of both, and it is well known that it will spin worse than a landplane

Gyroscopic forces were not considered in these tests at all At the start it was thought airplanes with right hand propellers spun worse to the left, and all test spins were, therefore, made to the left After the tests were

Fig VI Seaplane with short engine mount and sweepback going out to test the effect of a high horizontal tail

well along a check spin was made to the right, and recovery required a half turn more Thereafter, spins were made in both directions Starting the spins with the propeller stopped made very little difference in either right or left spins

Directly opposing the static weight of the airplane is the aerodynamic resistance If the speed of descent could be reduced, the speed of rotation should also be reduced The first tests to confirm this were made on a landplane with a turn and a half recovery All the interplane streamline brace wires were turned so they were "broadside to the wind." The high speed in level flight was reduced from 115 to 85 m.p.h During about the second turn of a spin, one couldn't tell whether the plane was even going to continue to spin or not Even after ten turns one had to force himself to believe it to be a tail spin It recovered in three-quarters of a turn with controls held in neutral

The same change was made on a seaplane, with a turn and a half recovery The transition from a normal to a flat spin is, at times, amusing In the stall before the spin the wires are quiet As the spin picks up speed, they start to sing and climb higher and higher in pitch until they nearly screech Then the tone suddenly drops clear down to the bottom again,—and there you are—flat With the wires crossed in the seaplane the chorus of the wires was even more comical The tone climbed very slowly till during the eighth turn, it was higher than ever—suddenly died—and the spin was flat as ever

Fig VII: Dihedral of 18 degrees in stabilizer The forward fin brace wire must be omitted if the stabilizer is adjustable

In the landplane the increased resistance had been enough to prevent a flat spin In the seaplane, with its less favorable mass distribution, the added resistance only delayed the flat spin It was later learned that using a flat deck float and round float struts and wires, the time for recovery could be reduced from one and one-quarter to one turn

Wind tunnel tests have been made of airplanes and wing cellules between angles of 0 and 90 deg and the range through which autorotation is possible calculated by the strip method. Wind tunnel tests have also been made of a wing cellule mounted on a spindle, and the altitudes for the different types of autorotation determined

The two tests are in fair agreement Further tests have been made with a piece of cardboard held in a welding rod in the blast of an electric fan laid flat on the parlor floor The latter test shows that the only way to keep the model from spinning, is to get the wing exactly level, and the axis exactly on the center line and even then it was possible through only a small range of angles of attack Free flight tests check the latter quite closely

In a normal spin the axis of rotation is on the center line, and the wings are approximately level If the stick is held clear back, the airplane may change its position by itself, or it may be changed by use of the ailerons

The amphibion as originally designed, spun quite beautifully. The airplane recovered from a six turn spin in three quarter turns with neutral controls In an attempt to improve the flight characteristics the span was increased 10 per cent, and a higher lift wing section used The lift curve of the original section is the dashed line in Fig. III, and the new section, the solid line The landing gear was simplified so the gross weight of the new airplane was 50 lb less than the original

The new model started flat in the latter part of the first turn of a spin Recovery after one and one-half turns required one turn with reversed controls (full down elevator and full reverse rudder) If allowed to spin longer the nose came up slowly to four turns after which recovery was possible in two and one-half turns. Longer spins were not made in that condition

Although the increase in span probably caused some of the trouble, it is very unlikely that it caused more than a small part of it In a group of five single float seaplanes of almost identical dimensions and weights the higher the maximum lift and the lower the maximum L/D of the wing section, the worse the spin

Fig VIII: After the trials The differences between this airplane and the one shown in Fig I are an increase in tail areas, dihedral in the stabilizer and Frise ailerons on lower wings only

In this case it was not desired to conduct an investigation but to apply the information gained from other tests The stabilizer span was materially increased, and the center of gravity moved forward 5 per cent Aileron and rudder areas were increased but for other reasons The finished airplane is shown in Fig IV The spin is more difficult to start, and the recovery meets the requirements of the Department of Commerce, even though it is not in the class in which spin tests are required.

The effect of decalage and washout was tested on a seaplane in which from a flat spin required five turns With the center of gravity at 26 per cent, 2 deg positive decalage and the wing tips washed out 4 deg by a change in rigging, the airplane could not be made to spin flat With either the decalage or washout removed, or the center of gravity back to 30 per cent, the plane spun flat and recovery required five turns With this arrangement, however, the plane was so stable laterally and longitudinally, it was declared unsuited for training purposes and was abandoned

Changes in dihedral were made on an airplane with a short engine mount and sweepback in which recovery from a prolonged spin required three and one-quarter turns With three degrees dihedral the spin could be started quite easily As the dihedral was reduced, entrance into spin became more and more difficult until with zero dihedral, it was almost impossible—the airplane merely falling off into a spiral Once the spin was started the dihedral made no difference

Aileron effectiveness varies with airplanes. In a good spinning airplane, the aileron position makes but little difference in a spin. In one case in these tests, as long as the ailerons were held in neutral, the plane spun normally. If the ailerons were set in the direction of rotation (inside stick) the plane stopped spinning, and went into a tight spiral. If outside stick were applied the spin went flat immediately. After the spin went flat recovery was impossible without outside stick. Invariably, the first sign that the airplane is changing its position relative to the axis of rotation, showing that the spin is going flat, is a force on the stick to the inside of the spin from the ailerons.

The Frise type ailerons on the upper wing with the interplane aileron struts on the landplane shown in Fig. 1 were entirely removed, it was impossible then to get a flat spin while recovery from a spin in the original airplane required four turns. This was due to three things—reduction in weight at the tips, Frise aileron removed, and remaining tapered effect of wing.

The upper ailerons on a seaplane were then inverted. To avoid delay in making new hinges, the old ones were used, giving an installation as shown in Fig. V (B). The spin would then not go flat without the use of power and outside aileron. In wild haste then the lower ailerons were inverted and the new hinges made as shown, to bring the ailerons down flush with the contour of the wing. The spins were then only slightly better than with the ailerons in their original position.

With the decalage washout combination mentioned above, the ailerons were inverted. When they were placed in their normal position the spins were flat again. In a seaplane with dihedral in the tail, and with straight ailerons, recovery required one turn. Replacing the lower aileron with a Frise type aileron, increased the time for recovery to one and one-quarter turns. The balanced ailerons, however, were considered to be worth the difference, and allowed to remain on the lower wings only.

A VERY RELIABLE method of improving the spinning characteristics of any airplane, is to increase the stabilizer span or area. The worst spin encountered in the tests was in the seaplane shown in Fig. VI, except that the original tail shown on the airplane Fig. I was used. After only two turns, the side force on the stick had piled up very fast, and recovery was started at once by giving full reverse rudder, full down elevator, and full outside aileron. All control forces were quite heavy. After eight more turns the stabilizer was rolled up to the top—that took six turns. Recovery started just before the stabilizer reached the stop, and required eight turns. The spin was 24 turns long, and only the first two were voluntary. Yet, the attitude of the airplane had not gone beyond about 40 deg. from vertical, while the ordinary flat spin went to about 70 deg. To observers on the ground, the spin had appeared to be perfectly normal.

An increas in horizontal tail area of only fifteen per cent delayed the transition to a flat spin till after the fourth turn, and recovery was possible after a prolonged spin in five and one-half turns without changing the stabilizer adjustment. With a total horizontal tail area increase of 50 per cent, and an increase in fin area of 80 per cent, recovery could be made in four turns. On the airplane with the long engine mount, the same increase reduced the time for recovery from five to three turns. An increase in horizontal tail area is much more effective than an increase in vertical tail area.

A horizontal tail was built to a perfect Clark Y section and tested. It made no change in the spins whether right side up or upside down.

There is a theory that the fin may be blanketed in a spin by the horizontal tail. Until the angle of attack of the stabilizer has increased to the buckle point, however, the aileron follows approximately the upper surface and the fin is not blanketed. If a spin could be so flat that the stabilizer has burbled with the elevators up, thereby blanketing the fin, there is no use pushing the elevators down or reversing a blanketed rudder—better jump out, and walk home.

Neither was it thought possible that the reason for the ineffectiveness of the horizontal tail was that it approximately followed a wing tip, and was in the tip vortex. Since both these theories could be tested at once by raising the horizontal tail, the change was made. The stabilizer and elevators were raised a distance equal to half the wing gap. The gap left between the two halves of the stabilizer was filled in with fabric. This airplane is shown in Fig. VI. The change made no difference in the spin characteristics.

The rear end of an airplane is traveling at a large angle of yaw in a spin, particularly in a flat spin. If the greatest lift from the tail is from the outside half (right stabilizer when spinning to the left) setting it at a positive dihedral angle should produce a negative pitching moment. The stabilizer was set at 6, 9, 12, 15 and 18 deg. positive dihedral on an airplane with long engine mount, and no sweepback. With zero dihedral, recovery required three and one-quarter turns. With dihedral set at 12 deg., recovery from either direction required one and one-quarter turns. Set at 18 deg., recovery from a right spin required two and one-quarter turns, and from a left spin three-quarter turns. Set at 6 deg., recovery from a right spin required two turns, and from a left spin, one turn.

The next day it rained.

The next day the tests were repeated, and the best results were obtained with the 8 deg. dihedral. On the production airplane the dihedral is set at 10 deg., merely because it is an easier number to remember.

On an airplane with a short engine mount and sweepback that required five turns for recovery from a prolonged spin, the dihedral in the tail made no difference in spinning characteristics.

Summary and Conclusions

1. The higher the terminal velocity of an airplane the more difficult the spinning characteristics.
2. A forward position of the center of gravity is favorable at times, but is not required in all airplanes.
3. Weights along the span should be small compared to the weights along the fuselage. The better way to reduce the precessional moment is to distribute the weights more widely vertically than to concentrate them longitudinally.
4. A twin float seaplane will probably spin better than a landplane, while a single float seaplane is sure to spin worse.
5. Airplanes with high maximum lift and low maximum L/D are the worst spinners.
6. Lateral and longitudinal stability will eliminate flat spins, but may make the airplane unpleasant to fly.
7. Frise ailerons are only slightly unfavorable.
8. An increase in stabilizer area and span is the most reliable remedy.
9. Positive dihedral in what would otherwise be a horizontal tail, may produce results.

THE STORY OF *Aircraft Tubing*

The Second of a Series of Three Articles on the History and Characteristics

By S. L. GABEL
President, Summerill Tubing Co.

and HORACE C. KNERR
Consulting Metallurgical Engineer, Summerill Tubing Co.
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S. L. Gabel

HOT ROLLED tubes are the raw material for the cold drawing mill. They are usually received by the latter in pieces about 20 ft. long, 2 to 4 in. in diameter, $\frac{1}{4}$ to $\frac{1}{2}$ in. wall thickness, according to the desired size of the finished product.

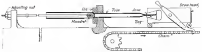
The first step is to cut the tube in halves or into shorter lengths. A point or tang (sometimes "tag") is forged at one end, by heating a short portion of the length in a forge and hammering between dies in a steam or electric hammer. Then the tube is "pickled" in a bath of hot dilute sulphuric acid to remove scale from the inside and outside surfaces and rinsed in clear water. This pickling will often disclose certain mechanical imperfections which have remained after hot working. Therefore the tubes are immediately inspected for surface defects.

The sound tubes are next dipped in lime to neutralize any traces of acid, dried in an oven and lubricated with graphite just before cold drawing. Or, they may be dipped into a lubricating compound, instead of lime, and allowed to dry in air until ready for cold drawing. At the cold draw bench the point or tang is passed through a doughnut-like die, made of very hard steel, whose internal diameter is somewhat smaller than that of the tube. At the same time a plug or mandrel of somewhat smaller diameter than the inside diameter of the tube is inserted into the open end and pushed to a position where it will exactly coincide with the die. The point of the tube is now grasped in the jaws of a draw-head, which is caused to move forward by a powerful chain, pulling the tube through the die and over the mandrel in a continuous forward motion. This simultaneously reduces the inside and outside diameter and the wall thickness, and of course results in a considerable elongation of the tube.

The tube has been hardened by the cold work of drawing and must go to the annealing furnace. Here it is heated under accurate control as to temperature, atmosphere and time until all the hardening effects of cold working are removed. Then it goes to the pickling

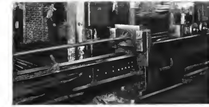
A portion of the Summerill mill showing draw benches in the foreground

tank again to remove the light scale caused by annealing, is rinsed, dried and lubricated as before, after which it is ready for the next pass through the cold drawing bench This time the die and plug are again slightly smaller than the present outside and inside diameters and the tube is drawn down to a smaller size and longer length. The cycle of operations, cold drawing, annealing and pickling are repeated again and again until the final desired diameter and wall thickness have been attained. A tube of small diameter and light wall may go through the complete cycle as many as 25 times Of course, after a certain number of cold passes the tube has reached a length when it can no longer be handled on the draw bench and must again be cut in half and the ends repointed



Diagrammatic view of draw bench showing seamless tube in the process of drawing

After reaching the final desired size, the point or tang end and the open end of the tube, which has been somewhat ragged, are cut off by means of a power hack saw Speed cutting wheels may be used, but these sometimes leave a thin ragged edge or burr



Center section of draw bench with tube in the process of drawing. Other tubes to be drawn are shown at lower left

The tubes are moderately bowed by the cold drawing operation, due to slight imperfections in the alignment of the die and other causes, and must be straightened It is necessary to anneal before this straightening operation

Several methods are available for straightening Round tubes of relatively heavy wall may be passed through a bar straightener which rotates the tube while it passes forward between a series of diagonally placed rolls

Another type of straightener has a series of rolls in a vertical plane staggered with each other and a similar set in a horizontal plane The rolls are grooved to fit the form of the tube, therefore this straightener may be used for square or elliptical tubes as well as round

Tubes of very thin wall will be crushed if passed through a mechanical straightener and must therefore be straightened by hand in the old fashioned way The operator places the tube between stops suitably mounted on a post, meanwhile sighting along its length and bending by hand until curves and kinks are removed. A good deal of skill is needed Streamline tubes and others of special shape, which cannot be passed through the rolls must also be hand straightened, sometimes with the aid of an arbor press A machine is being designed to straighten these special shapes but many difficulties have to be overcome

Tubes of 4130 X steel are desired by the industry to be in the normalized condition. These tubes therefore now pass to a normalizing furnace, where they are heated to a temperature of 1,600 deg F., withdrawn and allowed to cool with free circulation of air, giving them a tensile strength of 95,000 lb per sq.in. minimum with an elongation of 12 per cent, or more This must be done without producing an excessive scale in the tube. When the operation is correctly controlled the tube is oxidized to a bluish black color on the surface and there is no free scale The thickness of the oxidized surface is negligible and it acts as a mild protection against corrosion

Special furnaces have been designed to normalize aircraft tubing They are fired by gas and automatically controlled as to atmosphere and temperature

Tubes of steel No. 1025 are tempered after cold drawing by heating to about 1,000 deg F and allowing to cool in air This removes the extreme hardness of cold drawing and gives them a tensile strength of approximately 60,000 lb. per sq.in., with excellent ductility If normalized, this steel will develop the specified strength of 55,000 lb per sq.in. and 22 per cent elongation, upon which design is based, but many manufacturers find that the slightly harder tube passes better through shop operations A final straightening after normalizing or tempering is necessary

Tube ready to slip over mandrel

Straightening streamline tubing by hand with the aid of an arbor press

The tubes now are ready for the inspection department They are laid out, a few at a time, upon an inspection table, under a good light where they may be examined from end to end and around their entire circumference for mechanical defects, such as laps, seams, checks, die scratches and dents By looking through the tube toward a light placed at the other end, defects on the inside may be detected

A portion of the inspection table consists of a steel H-beam which has been planed so as to provide a straight edge 15 or 20 ft long and 8 or 10 in wide, upon which the tubes may be rolled to detect any departure from straightness beyond the specified limits (one part in 600) Such departure can be measured by slipping a shim of given thickness into the space between the tube and the straight edge Rapid and accurate inspection in this way is possible

The tubes are checked with a micrometer as to diameter and wall thickness Army-Navy specifications call for certain limitations as to the roundness or truly circular form of the outside of the tube, certain limitations as to the variation in wall thickness, and certain limitations as to the eccentricity of the bore with respect to the outside of the tube The wall thickness and eccentricity are checked at the ends of the tube, the diameter and accuracy of roundness at points along the length

While the tubes are being inspected for dimensions and flaws, tensile test specimens are taken from the required number in each lot together with such crush specimens as may be called for Whenever possible, the tensile tests are made in full section on a piece of the tube about 10 or 12 in long The ends of the specimen are plugged with accurately fitting plugs having well rounded ends. This type of specimen tests the full area of the tube and gives the most satisfactory indication of its physical properties When the tube is of too large diameter to be held by the grips, or is beyond the capacity of the machine as to strength a standard sheet metal test specimen is machined from the wall of the tube This specimen should be machined according to Army-Navy specifications to give the best results But when the material is well above requirements a simple specimen made by milling or sawing out a strip with parallel sides will show that specifications are met and requires less time and expense in machining If the specimen has been taken from a tube of fairly large diameter, its curvature is not considerable and it can be gripped in the flat jaws of the machine The slight flattening which occurs during pulling does not seriously detract from the physical properties obtained If, however, the curvature is sharp, the specimen should be flattened before pulling This must be done with care, using a soft hammer to avoid hardening the gauge section by cold working If the specimen is to be heat treated, this should be done after flattening not before

The crush test was devised for the purpose of detecting the presence of flaws in tubes, or a tendency to split or crack, due to unsound metal It is an excellent indication of ductility but as it is a very severe test, it should not be applied to other than soft tubing Steel No 1025 may be expected to stand the crush test in the normalized condition, but not in the tempered state, where a higher strength due to the effects of cold working, is retained Steel No 4130 X should be given the crush test only after annealing—not after normalizing, as the higher hardness and strength is sufficient to cause cracking in an entirely sound tube under this severe

Annealing furnace for aircraft tubing The recording pyrometer at the left gives temperature readings at six points in the heating chamber

treatment. Longitudinal flaws on either the inside or outside surface, if at all serious, will open under the crush test, and may readily be observed. If the steel is of poor quality it will crack transversly or longitudinally in the annealed state when the crush test is applied. If surface imperfections are noted in visual inspection, regarding whose seriousness there is doubt, a sample cut out and submitted to the crush test will often provide the answer.

The manufacturer of high grade steel tubing for aircraft today handles two kinds of material—mild carbon steel No. 1025, and chrome molybdenum steel No. 4130X.

Bar mill type of straightener for heavy wall round tubes

The 3½ per cent nickel steel No. 2330, formerly used for axles, is virtually obsolete. The two types of aircraft tubing are ordinarily put through production in the same mill. The greatest care is observed in the mill to avoid confusion of the two steels, but due to human fallibility, a tube of mild carbon steel may sometimes become mixed with a lot of chrome molybdenum steel or vice versa. In case the alloy steel became mixed with a quantity of mild carbon steel, no serious harm would result, as its properties would be superior. But if a piece of mild carbon steel became mixed with chrome molybdenum and was not detected, the danger would be serious because this steel in the normalized condition would be only a little more than half as strong as normalized chrome molybdenum steel, nor would it respond to heat treatment to any important extent. Some method for insuring that no mild carbon steel can go out in place of chrome molybdenum steel is therefore essential. This for a long time, presented a very serious problem to the steel tube manufacturer and also to the aircraft industry, but the problem has been solved in a satisfactory manner.

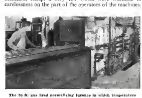
Up to the present no simple satisfactory method for rapidly separating chrome molybdenum steel tubing from mild carbon steel tubing by chemical means seems to be available. One method which has been proposed consists in treating filings chemically and observing a color reaction, but this is somewhat slow and inconvenient in a mill and is not sufficiently positive for routine inspection work. Furthermore, the results depend considerably on the physical state of the material, being indefinite when the chrome molybdenum steel has been normalized. As previously mentioned, nearly all chrome molybdenum steel tubing which is supplied to the aircraft industry today is furnished in the normalized state. If mild carbon steel had become mixed with chrome molybdenum steel, it would also have passed through the normalizing treatment. The problem therefore was to find a means to distinguish normalized mild carbon steel from normalized chrome molybdenum steel. Obviously there would be a difference in the hardness of the two steels, as well as in the tensile strength. Neither Brinell hardness tests nor scleroscope hardness tests can be used satisfactorily on thin walled steel tubing.

The Rockwell test is well adapted for the purpose, however, provided certain practical difficulties are overcome. It was found as the result of an extensive series of experiments described in an article in "Iron Age" of January 19, 1928 entitled "Inspection of Aircraft Tubing" that after normalizing, the Rockwell hardness of chrome molybdenum steel tubes was above 90B while that of mild carbon tubes similarly normalized was below 80B, thus affording a sufficiently wide margin to distinguish between the two types. No direct relation between the Rockwell hardness and tensile strength of these steels has been found. The Rockwell test here described is therefore merely a qualitative test and is in no sense intended to indicate the tensile strength.

THE PRACTICAL DIFFICULTY of supporting long tubes of a wide range of diameters and wall thicknesses in correct alignment with the Rockwell tests is great. The Rockwell test is influenced by variations of 1/10,000 in. in the position of the penetrator. Very slight misalignment or motion of the tube during the test is sufficient to spoil the reading. It is necessary to produce a clean bright surface on the inside and outside of the tube at the point to be tested, and to provide a mandrel extending into the open end of the tube to support its wall during test. All this must be done on a production basis, so that every chrome molybdenum steel tube produced by the mill may be inspected individually and without excessive cost.

A machine was developed for accomplishing all of this and has been in successful operation for more than a year. Many thousands of tubes have been tested on this machine and not a single failure has come to attention, except a very few which were traceable to carelessness on the part of the operators of the machines.

Roll type straightener for square, elliptical and other special section tubes, as well as small round tubes.



The 30 ft. gas fired normalizing furnace in which temperature and furnace atmosphere are automatically controlled.

GENERAL NEWS

Herbert F. Powell, *News Editor*

HIGH POINTS in the NEWS

▶ *Third and largest* Annual All-American Show opens in huge new hangar at Detroit. Eighty-two planes displayed inside with many outside on field; diesel craft a feature, first day attendance, 14,300.

▶ *Race changes discussed* National Air Pilots Association and manufacturers, hold meetings in Detroit concerning plans and regulations for National Air Races, Chicago, Aug 24-Sept 1.

▶ *Glides in on time* Capt. Frank M. Hawks ends San Diego-New York glider flight on Sunday afternoon April 6 as per schedule. Was towed across continent behind a Waco. Covered 2,860 mi., gliding time, 36 hr. 47 min.

▶ *More prices tumble* Fokker announces price cuts ranging from $4,000 to $13,000, on all its planes, save F-32.

▶ *You must be eighteen* Department of Commerce sets that as minimum age for a mechanic's license.

▶ *A night on the Atlantic* New York-Bermuda flight in pontooned Stinson Detrotter is interrupted 60 mi. from goal when night forced fliers to land on ocean. Flight is finished next morning, however.

Airports and Airlines

▶ *Merger or no merger?* U. A. & T. continues fight to gain control of N.A.T., despite the latter's disinclination to merge.

▶ *Eleven come seven* Starting April 26, Pan American Airways will inaugurate a seven-day mail service from New York to Buenos Aires to Montevideo in place of the eleven-day schedule now maintained. Night flying will make this time cut possible.

Foreign

▶ *English estimate debated* House of Commons hears arguments centering around proposed aviation budget for 1930-31 of approximately $89,250,000, or $4,450,000 more than last time.

Two F-32's Flying to West Coast

TETERBORO (N. J.)—Two Fokker F-32 planes, with 60 passengers, four pilots, two mechanics, and two stewards aboard, left here recently for the West Coast where they will be delivered to Western Air Express and placed in passenger service. The trip to Los Angeles is to be made with several stops.

Sergievsky's 23,222 Ft. a Record

NEW YORK (N. Y.)—Sikorsky test pilot Capt. Boris Sergievsky reached 23,222 ft. on March 13 in a 575 hp. Hornet powered Sikorsky S-38 carrying a 1,000 kg. (2,204.62 lb.) load, and thereby is credited with a new world record for seaplanes in that category. This altitude has been announced by the N.A.A., following barograph calibration. Franz Kneer, Germany, held the old mark of 20,960 ft., made in November 1928, in a Bristol Jupiter-powered Junkers W-34.

Minimum Mechanic's Age Fixed at Eighteen

WASHINGTON (D. C.) — The minimum age requirement for any class of a Department of Commerce mechanic's license has been set at eighteen years, announces Col. Clarence M. Young. This ruling is now embodied in an amendment to Section 66 of the Air Commerce Regulations through the addition of the following paragraph:

"(E) The minimum age requirement for any class of mechanic's license is eighteen (18) years."

"When the Air Commerce Regulations were drawn up several years ago," Col. Young said, "the minimum age requirement for any class of mechanic's license was purposely omitted, because at that time there was no precedent to guide the Department of Commerce, and those drawing up the regulations did not wish to place any undue burden on the industry or the mechanics.

"Since that time experience has taught us that the minimum age requirement of eighteen years is the lowest we can permit while keeping in mind the highly important part the mechanic plays in the safe operation of aircraft and the need for mature judgment and the constant display of vigilance."

Aeronautical Finance

In this issue, AVIATION begins an aeronautical finance department which will hereafter appear each week in the General News Section. Turn to page 774 for the initial article.

Goebel After Hawks' Record

WICHITA (KAN.) — Col. Arthur C. Goebel, one time west-east transcontinental record holder, will attempt, in May or June, to regain the record which is now held by Capt. Frank Hawks. He will fly a Lockheed Sirius.

All-American Show Under Way

Several Diesel-Powered Among 82 Detroit Show Craft

By John T. Nevill
Detroit Editor of AVIATION

DETROIT (MICH.)—Promising to be the industry's closest approach to the ideal aircraft exposition, the third annual All-American Aircraft Show, Detroit's annual contribution to the business of aeronautics, opened here in a new $1,000,000 hangar on City Airport April 5. The affair is to continue through April 13.

The show was formally opened following arrival of five Ford tri-engined monoplanes and a Fokker F-10 carrying government, civil, and aeronautic officials from Ford Airport. The dedicatory ceremony consisted of the presentation of a huge gold key by Hon. Charles Bowles, Mayor of Detroit, to Col. Clarence M. Young, Assistant Secretary of Commerce for Aeronautics.

The key which symbolized the fact that Detroit's City Airport and hangar henceforth will be ever open to the industry was then turned over to Edward S. Evans, chairman of the Show Committee, after which Col. Harold H. Emmons, member of the board of directors Detroit Aircraft Corp. and present Police Commissioner, City of Detroit, declared the exposition open to the public. Among those who participated in the formal ceremony was Gov. Fred W. Green, of Michigan.

Many Planes on Field

A total of 82 airplanes and 4 gliders are exhibited within the building, while approximately 50 additional planes are parked on the 250-acre airport. Inside the structure some 125 accessory booths help to cover the building's 205,000 sq. ft. of floor space.

According to figures released by Ray Cooper, manager of the exposition, more than 14,300 persons attended the event on the first day, which, incidentally, is approximately double the attendance registered on opening day of the Detroit show last year. This would seem to indicate that the idea of exhibiting both stationary and performing airplanes at the same show is a profitable one from the point of view of arousing public interest.

The exhibition, itself, is considered by many to be the most appropriately decorated ever staged. The color arrangements of the decorations blend in with the exhibits and while too gaudy have great eye appeal. It is quite evident that Detroit has learned much re-

(Concluded on Page 788)

N. Y.-Bermuda Flight Ends 60 Mi. From Goal

NEW YORK (N Y)—An attempted non-stop flight of approximately 700 mi from here to Bermuda, April 1, ended in the Atlantic some sixty miles short of the goal, Hamilton, due to darkness. However after a night on a calm sea, the crew of three were able to take off and continue to their destination. This is one of the first times such an ocean take off has been successful.

The plane, an Edo-pontooned, Wright J6-9 powered Stinson Detroiter, owned by the Pilot Radio and Tube Corp., Brooklyn, was manned by pilot William Alexander, navigator Capt. Lewis A. Yancey and radio operator Zeh Bouck. Alexander and Bouck are associated with the Pilot firm.

As the some three hundred and sixty islets comprising the Bermudas occupy a space about 18 mi long and 6 mi wide, perfect reckoning was necessary if the plane was to make its goal. For this reason, navigator Captain Yancey carried a very sensitive sextant, five carefully adjusted chronometers, and a drift indicator, as well as regular plane instruments.

Weighing approximately 5,600 lb fully loaded, the Pilot, as the machine is named, took off from North Beach, Queens, at 9 37 a.m. on the morning of April 1 and was forced down by approaching night at 5 51 p.m. It was with difficulty that the start from New York was made, due to the great weight of the plane and it was only after another craft had stirred up a wake that the Pilot left the water.

As Aviation Venture

The main purpose of the flight, state officials of the Pilot Radio and Tube Corp, its sponsor, was to experiment with two-way radio communication apparatus, and the results were declared highly satisfactory. The flight, moreover, was significant as an airplane navigation venture thus Captain Yancey, highly experienced in aviation, played a leading rôle.

The machine was in constant touch with a New York paper until it landed in the ocean, when the necessity of hauling in the trailing antenna caused temporary disruption of communications. The specially built transmitter employed was perfected by Bouck, who is engineer in charge of aeronautical radio research with the Pilot company. A damaged pontoon stay prevents the fliers from returning to New York by air.

Pilot firm officials will start on a 22,000 mi tour of South America in the Pilot after it is returned from Bermuda. It may be added that the Edo pontoons used were Model 4650, which are 20 ft 4 in in length.

Fourteen NB-3's Sold in '30

MARSHALL (MO)—Nicholas-Beazley Airplane Co. announces that since the first of the year it has delivered fourteen Barling NB-3's.

The Edo-pontooned Stinson just before the takeoff for Bermuda

ZRS-4 Center Rings Placed

AKRON (OHIO) — All five rings of the center section of the Navy dirigible ZRS-4 are now in position at the Goodyear-Zeppelin dock, Municipal Airport, Akron. These five rings—two of them main rings and three of them intermediate rings—constitute the vertical framework of the section. The main rings are spaced 76 ft apart and the intermediate rings are placed at equal distances between.

All-American Air Show Now Under Way

(Concluded from Page 767)

garding the arrangement of exhibits and building decorations.

The airplane division of the Ford Motor Co has one of the finest displays. One half of the Ford exhibit consists of two of the latest model tri-engine craft on the floor open to close inspection by the public. The other half consists of a papier mache relief map constructed to scale of Ford Airport and vicinity, above which is suspended a model 5-AT Ford with propellers revolving.

The buildings and topographical aspects in the vicinity are to scale and no detail is omitted, even telegraph wires along the railway right of ways and roads being strung up. The entire layout is a rather successful attempt to give the public a fair impression of an airplane passenger's view from an altitude of several thousand feet.

Displayed Inside, Flown Outside

As has been generally expected the first public exhibition of Diesel type engines seems to be the keynote of the show. Among the planes on the exhibition floor equipped with this engine are the Ford, Stinson Junior, Ryan, Eastman flying yacht, Towle flying boat and a Verville. The Packard Motor Car Co. which concern developed the Diesel aircraft engine has a Stinson Detroiter and a Waco both powered by Packard Diesels, on the field ready for flight demonstrations for prospective buyers.

The convenience of demonstrating machines similar to those exhibited in the exposition was seized upon by practically all of the manufacturers, a fact which should lead to sales on a scale never before experienced at any aircraft show. The industry, in fact, seems to be well pleased with the convenience and inexpensiveness of an aircraft show held on an airport without the disadvantage of competing with competitive events on the field itself.

Before the exposition opened considerable thought had been given to the problem of regulating traffic on the field to the satisfaction of all concerned. As a result definite regulations were drawn up and at this writing have proved to be effective.

Northwest Exposition To be Staged June 2-7

ST PAUL (MINN)—The first annual Northwest Aircraft Exposition is to be held at the Coliseum, mid-way between this city and Minneapolis, June 2-7, it is announced. Ray Kimm, manager of the recent Baltimore and Pittsburgh aviation shows, is to manage the Northwest event. Communications concerning the exposition may be addressed to his headquarters, 601 Wesley Temple Building, Minneapolis.

The general committee for the affair is composed of the following: Mark Hurd, president of Great Northern Aviation Corp, St Paul, Clarence T Powell, vice-president of Minneapolis Chapter of N.A.A.; Frank Geng, airport master, St. Paul Municipal Airport; Lynn C Jones, aviation representative of Vacuum Oil Co., Minneapolis; Charles B Carroll, president of Charles B Carroll Co, Minneapolis; William S. Brock, vice president of Schlee-Brock Aircraft Corp, Detroit; Edward F. Schlee, president of Schlee-Brock Aircraft Corp; L. D Hammond, airport master of Wold-Chamberlain Airport, Minneapolis; R R West, aviation representative of Standard Oil Co., Minneapolis, Eugene S. Shank, president of Shank Flying Service, Robbinsdale, Minn., Herbert D Putnam, vice-president and general manager of Canadian American Airlines, Inc., Minneapolis; Parr Nutter, Central Air Terminal Chicago; Francis J Ditter, Federal Aircraft Co, Minneapolis; C D Johnston St Paul Aero Club; C. T. Schramm, American Airlines, Inc., Minneapolis; Daniel Kiser, Curtiss-Wright Flying Service, Milwaukee; Paul M. Cole, Bellanca Aircraft Corp, St Paul; Norman G. Warsinske managing director of Aviation Country Club Minneapolis.

Curtiss-Wright to Send Group on Foreign Tour

NEW YORK (N Y)—As AVIATION goes to press word comes that Lieut James H Doolittle Capt James H Cannon, and Lieut James E Parker, are to sail from here on April 10, for Athens, Greece from where they will embark on a tour for the Curtiss-Wright Corporation.

Countries to be covered by the three Curtiss-Wright representatives during the tour which will last approximately four months include Greece Turkey the Balkans, the Baltic States, Poland Scandinavian countries, and Switzerland. Four planes—a Curtiss Hawk, Falcon, Fledgling, and Robin—are to be demonstrated by the group.

C. W. Webster, president, and John S Allard, general manager, of the Curtiss-Wright Export Corp, explained that the itinerary of the tour has been arranged in acceptance of official invitations from each of the countries to be visited.

"The tour," Mr Webster said, "presents a unique and valuable opportunity for American aircraft manufacturers. All of the governments to be visited are striving to build up their air corps. If we are at all successful, we feel we shall be opening new markets for the whole American industry in a field hitherto open only to Europeans."

Carrying Four Planes

Upon arrival April 21 in Athens the party will be met by Maj Melvin Hall, Curtiss-Wright representative in Europe, W F Goulding, of the New York office, and two mechanics, who will complete the personnel of the mission. The mechanics sailed two weeks ago with the four planes, extra engines and spare parts.

The first demonstration will be held late in April in Athens before high governmental and military officials. From Greece, the mission will fly through the Balkan countries, Turkey and north to Poland and the other countries on the Baltic. After visits to Norway and Sweden the planes will be flown across Germany to Switzerland, the last country to be visited before the return about Aug. 1 to the United States.

Bowlus on Eastern Tour

SAN DIEGO (CALIF)—W Hawley Bowlus, president of Bowlus Sailplane Co has gone East to demonstrate his glider before a nomber of aviation groups. Bowlus has shipped the one recently sold to Lindbergh—known as the Albatross—and plans to fly this machine at Detroit, New York, and other points. S C Breder, vice-president and sales manager of the Bowlus firm, is accompanying Bowlus and plans to complete arrangements in the East for nation wide distribution of the Bowlus product. Breder recently completed a trip along the Pacific Coast arranging for dealer representation at all important points.

Fairchild Orders 50 Comets

MADISON (WIS)—Comet Engine Corp has received an order for 50 series B 165 hp Comet power plants from the Fairchild Aviation Corp, Farmingdale, N Y. These engines will be used in the new Fairchild KR-34 sport and mail planes.

Gilbert & Barker Men on Tour

SPRINGFIELD (MASS)—Gilbert & Barker Mfg Co. officials are at present on a 15 000 mi tour of the country in the interests of their aviation fuel department. Flying a Kinner-powered Curtiss Robin, George Bendix, pilot, and Capt. W C Luth of the aviation department, are carrying with them special units and cut-away sections of equipment, including the Aeropit a two-compartment steel pit used to house fuel at airports. The pit is sunk in the ground so that its top is level with the field. Another device to be demonstrated en route is a new type filter-funnel for gasoline.

Army Orders 252 Hornet A's

WASHINGTON (D C)—An Army Air Corps contract has gone to the Pratt & Whitney Aircraft Co. Hartford, Conn involving 252 direct drive Model R 1690-A Hornet power plants and certain spare parts, to cost $1 450,570 72, a Washington release announces. These engines are being procured with funds available under the appropriations for the Air Corps for the fiscal year ending June 30, 1930 and are to be used in Keystone bombers recently ordered.

H-S Propeller Base Maintained

MILWAUKEE (WIS)—A propeller service station will be maintained at the Hamilton Metalplane Co. plant here for the Hamilton Standard Propeller Co, now that the Milwaukee branch of the latter company is in Pittsburgh.

Fokker Plane Prices Reduced

Cut $4,000 to $13,000; New F-32 Only Exception

DETROIT (MICH)—Price reductions ranging from $4 000 to $13 000 have been declared here at the Show by the Fokker Aircraft Corp on all Fokker planes except the large F-32 four-engined transport. The new listings states Capt E V Rickenbacker, vice-president in charge of sales, will make the first investment costs for operators as low as $1 500 to $3,600 per passenger seat. Economies in purchasing and manufacturing resulting from the affiliation of Fokker with General Motors are given as the foundations for the reductions.

Employing the General Motors deferred payment plan announced at the St Louis Show, those of recognized credit standing may now secure a seven-place Standard Universal cabin plane, Wright-powered for a cash outlay of a little more than $500 per seat, the total overhead investment in such a craft being less than $2,000 per passenger seat. The first costs of the larger and faster planes are not as low, it is true asserted Rickenbacker, but the larger planes provide economies not applicable to the smaller units.

Here Are the New Lists

The price of the F-32 remains the same, according to the announcement because it is already at a price applying the economies effected in the older list.

The reductions were announced as follows:

	Old Price	Reduction	New Price
Stand. Univ., 7 pl.	$15 000	$4 000	$11,000
Super-Univ., 7 pl.	21 800	4 300	17 500
F-14-A Mail 9 pl.	26,500	4 000	22 500
F-11-A Boat 8 pl	40 000	7 500	32,500
F-11-A Amph. 8 pl	42,000	8,225	33,775
F-10-A, 14 pl	67,500	13,000	54,500

"Chur," Exclaims Instructor Alton B. Sherman, Whereupon Mister Jui Lets Go of the Controls

BOSTON (MASS.)—"Now let me see you 'tooie ping shair,'" says Alton Brewster Sherman when he wants Shui Chi Jui to glide in for a landing.

Shui Chi Jui, who happens to come from China is taking a Curtiss-Wright flying course at the Boston Airport. He knew so "velly little" English that Jui and Sherman could hardly ever come to an agreement about exactly what meant what.

So Shui Chi Jui wrote out in English-Chinese some expressions that stood for various aeronautical terms and passed them on to Sherman, who immediately saw it was going to be easier and safer to learn them than to get stuck in the middle of a loop and not have anything to say.

So Sherman learned, and now the two of them have a perfect understanding—almost.

During the Summer, Shui Chi Jui will attend the Curtiss Wright resident flying school at Martha's Vineyard. Later he will return to Shanghai and start his own flying school.

Speaking of Chinese again, here is Sherman's newly-acquired Oriental vocabulary plus English equivalents: eye, nose of the plane kao up; ping level; shai, down; ping shai, glide; whai a turn, t'so left, yo, right, ny, 90 deg; too ny, 180 deg; chur, "let go of the controls"; tai doo, too much; ts'ien forward; hour, back, fay, flying, hor good, whair, bad; she, yes, fu, no; garfun high wind; tooie, normal; yo what right turn; t'so what, left turn; kao what climbing turn; etc.

Boeing Gas Tax Fight Carried Into Nebraska

LINCOLN, (NEB.)—Boeing Air Transport, Inc., has filed a petition for an injunction in the district court here against Nebraska officials to prevent them from attempting to collect the four-cent gasoline tax on gasoline brought from Oklahoma to Nebraska and used by Boeing in interstate commerce. It is claimed that the company uses around 250,000 gal. of gas a year and that the tax, if the state is permitted to charge on the fuel used in Boeing's planes running between Chicago and San Francisco, will amount to $10,000 a year.

The duty asked by the state for the month of February on 21,056 gal. amounting to $842.56 is made the basis of the present suit. An attempt was made to collect this tax as well as a tax of $111.04 on 2,776 gal. used within the state by the company. It is alleged that the state is interfering with interstate commerce in attempting to collect a tax on the gasoline used in interstate business but Boeing asks for no exception on fuel used in its trucks or local traffic planes.

Calls Law Void

It is set out in the petition that Boeing buys its supply of gasoline from the Phillips Petroleum Co., Tulsa, Okla., on contract and has it shipped in tank cars to Fort Crook and North Platte, Nebraska, where it is stored for refueling its planes on the transcontinental trips. It is claimed that the law passed by the Nebraska legislature imposing the tax on this fuel is void, that the tax cannot be imposed upon interstate commerce, is not an excise tax, and is an attempt of the state to regulate interstate commerce.

The company further alleges that the act violates the constitution of the United States as it deprives the company of property without due process of law. It is also set out that the state threatens to cancel the licenses permitting the company to deal in gasoline so it is asked that the injunction remain in force until the case is determined. The suit was filed by Brogan, Ellick and Van Dusen, of Omaha.

Seeks to Compel Payment

A suit will be filed by the state to compel the aviation company to pay the tax as the state law makes no distinction between gasoline consumed entirely within the state and that which may be carried into some other state and used there, except where dealers send it out of Nebraska after paying the tax here. For such fuel, when it is sold in other states, the tax is refunded. All other state carriers including railroads and bus lines pay property taxes in Nebraska, and the state does not recognize any exception for such concerns from the gasoline tax.

Boeing paid the full gasoline tax assessed for December and January, but registered a protest against a portion of fuel claimed as exempt under interstate commerce laws and regulations. No other user of aviation gasoline has thus far balked on paying the tax in Nebraska, but most of the flying is done within the borders of the state, so the interstate question does not affect the majority of plane owners. The result of the present case will be to determine whether the state can enforce collection of the gasoline tax against any aviation company which is engaging in interstate traffic.

Governor Weaver, of Nebraska, commenting on the recent communication from the Phillips Petroleum Co. asking support of a ruling which would exempt aviation gas from taxation in all the states, is said to have declared there was some merit in the proposition but that he was not yet ready to recommend such a proposal for Nebraska.

Newton Firm Buys Bolte Aircraft

DES MOINES (IA.) — United Air Activities, Inc., Newton, Iowa, has purchased the Bolte Aircraft Corp., of this city, the sale including all equipment, machinery, and materials for a reported consideration of $3,600. Officials of United Air Activities are W. Allen Whitfield, president, J. H. Allen, vice-president, and Mae McLaughlin, secretary-treasurer, all of this city. The Newton firm was recently granted a charter for a $100,000 capital, to be represented by 4,250 no-par shares.

Dr. Otto Merkel Here

OUR PHOTO SHOWS Dr. Otto Merkel, director of the German Luft Hansa, as he arrived in New York recently aboard the S.S. *Albert Ballin*. Dr. Merkel first visited Washington, D. C., to participate there in the 50th Anniversary Convention of the American Society of Mechanical Engineers.

New York Show Entries Have Now Reached 110

NEW YORK (N. Y.)—More than 90 per cent of the exposition space at Madison Square Garden for the New York Aircraft Salon, May 3-10, has been allotted, declares Charles L. Lawrance, chairman of the show section of the Aeronautical Chamber of Commerce, which is sponsor of the exposition.

Thirty-nine different plane manufacturers and eleven engine producers are included in the 110 exhibitors already listed. It is expected final entries will bring more than fifty planes.

A list of exhibitors follows: American Aeronautical Sales Corp., Bellanca Aircraft Corp., Boeing Airplane Co., Buhl Aircraft Co., Chevrolet Aircraft Corp., Davis Aircraft Corp., Detroit Aircraft Corp., Eastman Aircraft Corp., Fokker Aircraft Corp., Ford Motor Co. (Stout Airplane Division), General Airplanes Corp., Great Lakes Aircraft Corp., Huntingdon Aircraft Corp., Ireland Aircraft Inc., Lockheed Aircraft Corp., Mercury Aircraft, Inc., Nicholas-Beazley Airplane Co., Inc., Parks Aircraft Inc., Pitcairn Aviation Corp., Ryan Aircraft Corp., Seaboard Aircraft Corp., Sikorsky Aviation Corp., New Standard Aircraft Corp., Stearman Aircraft Co., Steffens Aircraft Corp., United Aircraft & Transport Corp., Verville Aircraft Corp., Chance Vought Corp., Waco Aircraft Corp., Whittelsey Mfg. Co., Inc., Adams Air Mail Pick-Up, Aero Supply Co., Air Associates, Inc., Aircraft Safety Devices, Inc., Airports, Airway Age, Aluminum Company of America, American Airways, Inc., American Tel. & Tel. Co., Atlantic Air Service, Inc., Aviation Engineering, AVIATION Magazine, Balsa Wood Co., Inc., Bendix Brake Co., E. W. Bliss Co., Boeing System, Brenack, Inc., Buhl Stamping Co., Andrew W. Campbell, Inc., Canton Drop Forging & Mfg. Co., Colonial Flying Service, Comet Engine Corp. (Air Investors, Inc.), Continental Aircraft Engine Co., Curtiss-Wright Flying Service, Curtiss-Wright Sales Corp., (New York City, N. Y.), Eastern Aeronautical Corp., Eclipse Aviation Corp., Edo Aircraft Corp., Egyptian Lacquer Co., Elgin National Watch Co., Fleischman Transportation Co., Ernst Heinkel Flugzeugwerke, Hamilton Standard Propeller Corp., Harwen Products Co., Imperial Brass Mfg. Co., International Nickel Co., Inc., Irvin Air Chute Co., Isotta Motors, Inc., Kendall Refining Co., Walter Kidde & Co., Kinner Airplane & Motor Corp., Kimball Motor Co., LaRose Airways, Inc., E. B. Meyrowitz, Model Airplane News, New York Aircraft Distributors, Inc., New York, Rio & Buenos Aires Lines, Inc., Newark Air Service, New York Times, Packard Motor Car Co., Pan American Airways, Inc., Parks Air College, Inc., Penna. R.R. Co., Pioneer Instrument Co., Pratt & Whitney Aircraft Co., Radiomarine Corporation of America, Rainbow Light, Inc., H. H. Robertson Co., Roosevelt Field, Inc., Russell Parachute Co., Scintilla Magneto Co., Sinclair Refining Co., Sky Specialties Corp., A. G. Spalding & Bros., The Sportsman Pilot, Stanavo Specification Board, Inc., Standard Oil Company of New York, Stewart-Hartshorn Co., Stout Air Services, Inc., Stromberg Motor Devices Co., Summerill Tubing Co., Texas Company, Time, Inc., Thompson Products, Inc., Warner Aircraft Corp., Westchester Airport Corp., Western Air Express, George A. Wies, Inc., Wright Aeronautical Corp., Western Electric Co.

Lambert Develops Glider Engine

MOLINE (ILL.)—Samuel B. Lambert, president of the Lambert Aircraft Engine Corp., announced the development by his firm of a two-cylinder engine for use in powered gliders.

"QUOTES"

One Opinion. "Necessary re-adjustments within the industry have been practically completed, and the future is faced with sounder conditions upon which to build than ever before in aeronautical history. Present conditions are strongly indicative that the industry has completely eliminated the past handicap of over-organization, over-production, and over-supply of units for which there was little demand. No other specialized line of our industrial world is showing such rapid progress as is the aviation industry at present."—W. L. HINDS, Crouse-Hinds Co.

And Another. "Contrasted with the great initial expansion of 1929 in the use of aircraft is the fact that the trade itself has been pronouncedly depressed, a situation which is indicative of over-expansion. It is this situation that the whole manufacturing end of the industry is facing today, and until it is corrected it will continue to be an important factor in judging what coming months will bring to individual units. Efforts to predict growth of the industry in 1930 and the prospects of the many companies engaged in it are largely a matter of guess work at this time."—W. O. WARNER, Warner Aircraft Corp.

. . . Begins at Home. "This writer believes the fault of slow growth lies with ourselves; we are not talking a language the public understands. Let's all stop stunting demonstrations, dirty weather flying, and circus side-show ballyhoo. Let's convince Dad and Mother of the practicability of flying and sport of flying."—L. C. PERKINS, Lincoln Aircraft Co.

Winged Bloodhounding. "There is no limit to the progress and usefulness of the police air service. We must be ahead of the criminal element which will one day use planes as effectively as it now uses automobiles and taxicabs. The criminal has not been slow to learn 'the way of the eagle in the air.' Already ten cases are on record where the airplane has been used by the criminal in making his escape. What we now need is a State Air Police Force."—POLICE COMMISSIONER WHALEN, New York City.

Add Aero Superstitions. "The reason the releasing ring on a parachute is on the left side is that in falling through space your right hand automatically reaches for your heart, and, if yours is in the right place, it'll be under the ring."—WALTER WINCHELL, New York columnist.

In Rome Fly as the Romans. "These international airplane services are springing up, and I see danger in all of them unless they employ aviators of all the countries interested. Otherwise somebody will sooner or later get into trouble as sure as anything."—DR. BRUNO ROSELLI, Italian Department, Vassar.

Two Fords Ordered by Navy

FORD AIRPORT (DETROIT) — Two Wasp-powered 5-AT Ford planes with slight modifications have been ordered from the Ford Motor Co. by the Navy Department. Features include a trapdoor in the floor of the machine to permit the loading of an extra power plant if necessary, and seats of a special type to accommodate men wearing parachutes. The first craft is to be sent to Anacostia Naval Air Station within 30 days or less and the second is to be received in Detroit in about two months.

F.A.I. Head Pays Us Visit

COUNT HENRI DE LA VAULX, president of the Federation Aeronautique Internationale, as he appeared on his recent visit to Los Angeles. The Count is now on a tour of the United States, having arrived in this country via El Paso, Tex., after a study of commercial aviation in South and Central America. He flew from Texas to the Pacific Coast and thence east to Chicago, where he was most recently entertained.

Report Eagle Production Rate

KANSAS CITY (KAN.)—E. E. Porterfield, Jr., president of the American Eagle Aircraft Corp., announces the company is producing the 201 Kinner-powered biplane at the rate of one per day and the new four-place monoplane at the rate of one per week. The monoplane uses either a Wright J6-5 or Continental Seven engine. Mr. Porterfield states sufficient orders are on hand to absorb the biplanes and monoplanes produced up to May 1.

Re-Elect Supeeme Propeller Men

WICHITA (KAN.) — At the annual meeting of stockholders of the Supreme Propeller Co., all the officers were re-elected for 1930. They were George H. Siedhoff, president, C. A. Noll, vice-president, M. J. Stone, treasurer and general manager, S. J. Stone, secretary, A. B. Sanders and C. A. McCorkle, directors.

NEW PLANES

A two-place sport monoplane, powered with a five-cylinder LeBlond engine, was recently tested at Boeing Field, Seattle, by John E. Blum, Northwest Air Service. The craft, designed by L. Froehlich, is the product of the Northwest Aircraft and Motor Corp., which has two three-place planes under construction. The sport machine has a wing spread of 40 ft., weighs 1,060 lb. fully equipped, and employs Goodyear Airwheels.

University Aircraft Corp., Seattle, capitalized at $90,000, is building a one-place flying boat, designed by H. D. Chambers, head of the firm. The craft is to weigh 650 lb., have a 30-ft. spread, and a length of 17 ft. 8 in. Porter Sligar is general manager of the firm, which has offices at 618 Northern Life Tower Building and a factory at 2021 Minor Avenue North.

Quantity production of a two-place cabin biplane, designed by Capt. Charles R. Bowers and Harold L. Scholl, and built at South Bend, Ind., is planned. This is announced by C. T. Stedman, one of the promoters of the craft, who declares a company will be organized shortly to manufacture the machine. The plane has a tapering lower wing and employs a Rover engine.

A four-place cabin monoplane is being tested by the McMullen Aviation Corp., Tampa, Fla. The craft's construction was financed by the same group which built the Mac Airliner here about a year ago.

Gliders

The Buzzard, a powered glider with a span of 35 ft., a chord of 5 ft. 3 in., and a weight of 460 lb., has been completed and put through a number of tests by Motor Gliders, Inc., Dayton, Ohio. It is stated that the machine, using a two-cylinder A.B.C. air-cooled Scorpion engine, will be marketed under $2,000. Oleo landing gear is employed on the craft.

W. Woerner is president and sales manager of Woerner Aircraft, Inc., Oakland, Calif., which recently completed a small type glider. It is the firm's plan to manufacture two types of sail planes and it is expected that 75 of them will have been constructed by the end of the year.

First Cabin Spartan Produced

TULSA (OKLA.) — Spartan Aircraft Co. has produced its first cabin plane. The craft has a fabric-covered chrome molybdenum steel fuselage, fashioned elliptically, and dual operating controls of both torque tubes and cable. Wright J6-7 powered, the plane has the following specifications: length 31 ft. 6 in., span, 50 ft., height 9 ft., wing area, including ailerons 299 sq. ft. Blue prints have been approved by the Department of Commerce.

Hawks' Cross-Country Glider Trip Ends at N. Y.

NEW YORK (N. Y.)—Virtually on time to the minute, Capt. Frank M. Hawks landed his Eaglet glider at Van Cortlandt Park, this city, at 4:15 p.m. Sunday afternoon, April 6, after a flight across the continent via a tow-line from a Waco.

The trip which started from San Diego, Calif., Sunday, March 30 at 7:45 a.m., ended shortly after four o'clock on the following Sunday, as a crowd of 15,000 persons, Police Commissioner Grover A. Whalen, and Bronx Borough President Henry Bruckner and several aviation notables greeted the flier.

Twelve during the 2,860 mi. flight covered in 36 hr. 47 min. actual flying time, the towing rope broke—once near Tucson, Ariz., and again near Terre Haute, Ind., but in each case repairs were made without much delay.

Two Bad Stretches

The worst weather along the route was encountered between El Paso and Pecos, Tex., and between Buffalo and Syracuse, N. Y., the last day of the journey. During the former stretch of bad weather, the plane and glider ascended to more than 10,000 ft. in an effort to reach better flying conditions. The stage across New York state seemed to strain the control surfaces and Captain Hawks experienced difficulty in keeping the Eaglet steady due to a heavy right wing.

Duke Jernigin piloted the Waco and his only passenger was Wally Franklin, a brother of Prof. R. E. Franklin, who designed and built the cabin glider Eaglet. The Texas Company was sponsor of the venture. Captain Hawks heads that firm's aviation department.

Aided by Radio and Phone

Telephonic communication maintained between Hawks and Jernigin, via a wire joined to the towing cable aided in the success of the trip. Hawks was also equipped with a radio set.

The following nineteen stops were made on the trans-continental journey: Yuma, Phoenix, Tucson, Ariz., El Paso, Midland, Sweetwater, and Wichita Falls, Tex., Oklahoma City and Tulsa, Okla.; Springfield, Mo.; East St. Louis, Ill., Terre Haute and Indianapolis, Ind., Columbus and Cleveland, Ohio; Buffalo, Syracuse, Albany and New York City, N. Y.

First B.C. Boeing Boat Tested

VANCOUVER (B. C.)—British Columbia's first factory-built flying boat passed successful flight tests here recently. The craft is a product of the Boeing Aircraft Company of Canada, Ltd., Vancouver, and is a modified type especially adapted for flying in this province. Capt. E. J. Burke, president of the Air Pilot, Engineer and Navigator Association, was test pilot.

More Than 1,000 in N.A.P.A.

CLEVELAND (OHIO) — Membership in the National Air Pilots Association, with headquarters at Cleveland, now totals more than 1,000, Carl F. Egge, executive secretary, reports. Memberships are divided into class A, which includes pilots whose work consists of flying, and class B composed of pilots whose main duties lie in such fields as selling and management. Will Rogers and Harry S. New, former Postmaster General, are the only honorary members. Rogers was elected for his continued support of aviation and New for his work in developing the air mail service. Fifteen women are members.

First National System Organizes Flying Unit

PORTLAND (ORE.)—Formation here of the National Solo Flying Corp., a new associate of First National Flying System, Inc., has been announced with Jack E. Allen, vice-president of Adcox Schools, Inc., and treasurer of the First National organization, as president. The new company will be First National's flying instruction unit.

Other members of the First National body are Adcox Schools and Aircraft Builders, Inc., maker of the Student Prince, two-place training biplane.

Besides Allen, officers of the National Solo Flying Corp. are Edward J. Swindells, president of First National; vice-president, Judge Thomas C. Burke, former Portland collector of customs, treasurer, and Irving C. Allen, attorney, secretary. Those on the board other than the officers are L. L. Adcox, president of Adcox Schools and Verne Dusenbery, attorney.

Capitalization of the company is set at $200,000. R. E. Gilliam will have charge of instruction which will take place for the time being at the Portland Airport. Student Prince planes will be used.

An agreement has just been signed with the Chinese government whereby a certain number of Chinese will receive their flight courses at the National Solo school. Chang Tien Chaou, delegate of the Chinese ministry of foreign affairs, represented the government in the transactions and will have direct supervision of the students.

Ten Slated in Fall

This new arrangement follows an earlier one whereby the students were brought here to study ground work and aerial engineering in the Adcox Schools. Adcox will continue to teach that work while the new school teaches actual flying.

The first ten Chinese started their studies last fall and four more are now on their way here. It is also stated that between 50 and 100 men chosen by competitive examination from Chinese Colonies in America will be sent here for training. As well as the foreign students at the school, 25 others have signed up for courses.

National Race Plans Discussed at Detroit

DETROIT (MICH.)—Proposed plans and regulations for the National Air Races to be held in Chicago, Aug. 24-Sept. 1, were discussed here recently during the All-American Show. Meetings were held by the National Air Pilots Association and manufacturers. Among those in attendance were Cliff Henderson, Maj. R. W. Schroeder, Maj. Luke Christopher and others interested in the coming event.

Adoption of the following proposals were favored: barring of craft without ATC though ATC not deemed necessary for engines; events divided into two classes, professional and sportsman; all entries to have racing colors; penalize money winners $50 if they fail to use tail wheels; entries classified according to piston displacement rather than horsepower; cabin and open machines should not participate in the same race. A further study will be made of engine requirements and rulings.

Several Feminine Events

The scattering pylon plan may be employed if it is found successful during some races to be held at Curtiss Airport, Chicago, on July 4, when one pylon will be placed 2 mi. and another 4 mi. from the starting line.

Where weather conditions prevent one of the National races from being run, it will be scratched off the program entirely, though this is not likely to apply to trophy races. All trophy events, including the Thompson Trophy Race, will be held the same day.

Conference members agreed women should be given a generous place on the card. They also discussed ways and means of some system which would give those attending the National Air Races a chance to know how each race was going on at all times. For the more important events, boxes will be fitted up with telephones so as to keep the crowd informed up-to-the-minute.

To Offer $10,000 in Each Race

Cliff Henderson stated that the program will be more elaborate than ever and $10,000 in cash prizes will be offered for every race. Major Schroeder has asked that all prospective competitors communicate with him during the next 30 days giving their views on the rule and regulation changes. Address: Maj. R. W. Schroeder, Curtiss-Wright Flying Service, 1338 South Michigan Ave., Chicago, Ill.

Continue With LeBlond Models

CINCINNATI (OHIO)—The LeBlond Aircraft Engine Corp. will continue the production of its "66" and "99" engines during the coming year. The basic design of the original LeBlonds has been found sound and the company still holds to it. The new engines offer many refinements in details and accessories and give a slight increase in power.

Offer $7,000 in Prizes To Bowles Race Winners

SPRINGFIELD (MASS.) — Valuable trophies and $7,000 in cash prizes are being offered by the Springfield Chapter N.A.A., to winners of the two-day race meet scheduled for the Bowles Airport dedication May 31-June 1, following completion of the New England Air Tour, on May 30. Nineteen events have been planned and there are to be four prizes awarded in each one save in the pony express relay for which there will be three.

Winners of the parachute jumping contest and races only open to National Guard and service planes will receive trophies. The National Aeronautic Association Contest Committee has approved the Bowles Airport program. Entry blanks are now available at offices of the Springfield Air Races Corp., State Building, Springfield. However, to be eligible, pilots must hold a Department of Commerce license and the F.A.I. and sporting licenses issued by the N.A.A.

Races will start at one o'clock in the afternoon and it is expected that each day's events will be completed by six o'clock. Race meet officials are: Manager, Frank T. Wyckoff; assistant manager, James L. Hanchett; referee, Maj. Luke Christopher, Washington, D. C.; technical chairman, Capt. Clarence M. Knox, Hartford, Conn.; assistant technical chairman, Arthur E. Center. Plans call for erection of a grandstand at Bowles Airport to seat 10,000 persons, administration offices for race meet officials and pilots, and press stands. A special feature of Saturday morning, May 31, will be a model airplane contest for New England boys.

Program and Awards

The program of events for the two day race meet and the prize money for each is as follows: 450 cu.in. displacement cabin race stock model, $750; 450 cu.in. displacement open race stock model, $750; 800 cu.in. displacement cabin race stock model, $1,000; 800 cu.in. displacement open race stock model, $1,000; free for all race, $1,000; dead stick landing contest, $250; pony express relay race, $600; parachute jumping, National Guard and service trophies; National Guard Race, trophies; Army and Navy flying demonstration; bomb dropping contest, $250; balloon bursting contest, $250; women's free for all race, $1,000.

Rapid Aviation Elects Board

COUNCIL BLUFFS (IA.)—At the first annual meeting of stockholders of Rapid Aviation, Inc., held recently, Walter Halley was re-elected president of the board of directors for the ensuing year. Others elected to the board were Donald M. Halley, Paul B. Selby, Melvin C. Bekins, Samuel A. Hauser, Arthus Klopp, C. E. Goddard, E. C. Eppley, John McGurk, S. R. Gordon, and J. T. Stewart.

Flown by Fleming to New Load-Speed Record

HERE IS THE TRI-ENGINED Bach transport in which Pat Fleming, Bach firm pilot, broke the world speed record for planes with a 2,000 kg. load over the 100 km. distance at Los Angeles, March 26 (AVIATION, April 5, p. 733). The mark attained by this plane was 142.66 m.p.h., thus bettering by more than 3 m.p.h. the former record of 138.904 m.p.h. held by Paillard and Camplan, of France, who established that speed in November, 1928, in a Bernard plane. Fleming's flight was checked by Joe Nikrent, N.A.A. timer, and Gerald Ryder and Ray Nikrent, observers. The plane carries a Wasp in the nose with J6-7's under each wing.

Senate Demands Crash Data

WASHINGTON (D. C.)—The United States Senate on April 7 passed Senator Ransdell's resolution requiring the Department of Commerce to furnish the results of the investigation of a collision between two aircraft over Menefee Airport, New Orleans, August 25, 1929.

Hold First Wichita Glider Meet

WICHITA (KAN.)—The first glider meet ever held here drew a crowd of 40,000 people to the Municipal Airport on March 30. It was claimed to be the greatest crowd ever assembled here for an aeronautical event. Col. Arthur C. Goebel and Clyde V. Cessna participated in the competition. Kenneth Doze, Norwich (Kan.) Glider Club, won the primary glider event with a 468-ft. hop reaching an altitude of 23 ft. Eldon Cessna was first in spot landings while Goebel was first in the second primary event with an average of 440 ft. for three flights and an average altitude of 21 ft. 8 in. Two women, Miss Wanda Cessna and Mrs. Mildred Verts, were among the competitors.

Navy and Army Order Fleets

BUFFALO (N. Y.)—Consolidated Aircraft Corp. has received Army and Navy Air Corps orders totalling 21 planes for approximately $200,000, states Lawrence D. Bell, general manager of Consolidated. Fifteen Kinner-powered Fleet Training craft, with additional spare parts, call for June delivery to the Army at Brooks Field, San Antonio, Tex., while one 575 hp. Hornet Fleetster will be sent to Wright Field, Dayton, Ohio, May 1, for Army test purposes. The Navy has ordered six Fleets with spare parts for April delivery at the Pensacola (Fla.) Naval Air Station.

Parks Developing Prop Press

ST. LOUIS (MO.) — A two-thirds saving in cost of service and repairs on damaged metal propellers is predicted by Parks Air College through use of a combination press being developed by that school.

Fit OXX-6 Robin for Prestone

BOSTON (MASS.) — The first commercial airplane to use an engine cooled by Prestone (ethylene glycol) instead of water, is being completed at the Boston Municipal Airport by Curtiss-Wright Flying Service. It is a Curtiss-Robin equipped with an OXX-6 engine with the radiator cut down to conform to the requirements of Prestone. The plans were drawn up by Harry Copland, Curtiss-Wright manager, and Paul Battalana, and the work done by Douglas Husted and Robert Whittemore of the Curtiss service department. "We are not claiming anything until we see it fly," says Copland.

N.A.T. Prepares Gas Tax Suit

OKLAHOMA CITY (OKLA.)—A suit to determine whether air mail planes must pay state highway gasoline taxes is being prepared by National Air Transport and will be filed in Tulsa, company officials here have stated. N.A.T. contends planes carrying mail and engaged in interstate commerce are not subject to the gasoline tax levied for highway purposes.

Curtiss Reid Builds Two a Week

MONTREAL (QUE.) — Curtiss Reid Aircraft Co. is now working on a schedule of two planes per week. The firm is considering plans for expansion if market possibilities are offered in the Far East and South America.

AERONAUTICAL FINANCE

By R R Doane

Mr Doane, who has written several articles on finance for Aviation, *will conduct this department each week as an informative service for those members of the industry who desire a record of the financial pulse as a guide to their ventures Mr Doane will interpret the financial news and discuss the movements of securities, and analyze the relative changes in value.—Ed.*

At no time since the low point reached by aviation securities during the first week of this year has there been such a wide average daily volume of sales coupled with consistent advances as has been witnessed during the past fortnight. As a matter of fact, from the point of sales volume, a record peak has just been established. The total volume for the week ending March 28, standing at 1,128 000 share sales as against 894 800 total sales for the week ending May 11 last when air stocks were making their record highs. This represents an increase of 100 per cent over the previous week's trading and an increase of 200 per cent over the same week of a year ago, while during the year's time there has been a decrease of 52 per cent in the total number of individual aviation stocks traded in.

Thus, from the standpoint of an apparent growing public interest in aviation, as manifest through purchases of the industry's securities, the present confidence is proving more than satisfactory.

The most conspicuous gains since the first of the year have been witnessed in the following stocks:

	Dollar Advances per Share	Percentage Gain
United Aircraft	50	115
Western Air Express	27¼	150
Aviation Corpn. of Amer	24½	100
Fokker	20¾	155
Nat'l Air Transport	14¼	127
Irving Air Chute	13½	186
National Aviation	11¼	156
Consolidated Aircraft	10	65
Douglas Aircraft	7¾	58
Curtiss Wright	7¼	116
North American Aviation	5¾	100
Aviation Corporation	3⅜	73

Behind this promising rise in values stand the industry's cumulative efforts in cooperating to minimize the action of conflicting forces, both on the supply and demand side during the past twelve months As a result a welcome measure of stability is well under way which bids fair to eradicate, as far as possible, the vicious unbalanced production with the depressing results that characterized the industry's experience during 1929

At the present time, with practically all of the income statements now available for the past calendar year much of the obscurity surrounding the industry's financial position has been cleared away In spite of many large deficits and the charging to current income of considerable capital expenditure, the industry's statistical position is excellent That the recent material advances have been made in the face of full knowledge of past earnings, together with the best season of the current year still lying ahead, can only prove a substantial return of confidence

INDEX COMPARISONS

	Week Ending March 28 1930	Same Week 1929
Aviation stock averages	28 87	49 49
Volume of share sales	1,287,868	416 100
Number of stocks entirely traded in New York market	44	87
New Aviation Issues (1st Qtr)	32,000 000	145 000 000

There is, at the present writing no evidence that there will be any restriction in three of the largest outlets for the industry's product, namely, replacement, export, and government purchases

So far as the relationship of the industry to the general business structure of the nation is concerned, it cannot help but benefit through a return to normal conditions The second quarter of this year will undoubtedly witness a sharp upturn in our total volume of trade and total physical production, with ample capital funds capable of caring comfortably for an advancing industrial program

Select Seattle Air Week Officials

SEATTLE (wash)—Valentine Gephart has been selected as general chairman for this city's Air Week celebration, to be held April 21-27, under the auspices of the National Aeronautic Association Other committees are as follows operations and program, Maj David Logg, chairman Lieut Howard Beswick, William Williams, and Ensign John Blum publicity and advertising, R. L. Biggs, chairman, Newell Farar vice-chairman G A Nickell finance, G L Streihke, chairman T D Stimson, Harry Lear, William O McKay.

Report on Aero Insurance Co.

NEW YORK (n. y.)—Aero Insurance Co.'s report as of Dec 31, 1929, reveals the following, according to state superintendent of insurance, Albert Conway total admitted assets $1,166,451; total liabilities $490,853 capital, $500,000 surplus $175,597; surplus for policyholders, $675,597 capital stock, 500 shares of $100 par value (The year's report for Aero Underwriters Corp which manages Aero Insurance, was printed in Aviation March 15, P 538)

Statistical Number Corrections

There appeared on page 562 of the March 22 statistical issue of Aviation, a map showing the density of licensed and identified aircraft by population The state of Minnesota has been filled in to show a total of less than 10 000 persons per plane This is an error. The population per licensed or identified airplanes for the state of Minnesota is between 10,000 and 15 000 The area corresponding to that state should, therefore, have lines on both diagonals instead of solid black.

On page 572 of this same issue there appears a table of the status of aircraft and pilots by states An error in this table has been called to our attention, namely that the total number of pilots in the state of Massachusetts should be approximately 252 instead of 70 as listed The breakdown of these licenses is as follows: private 122 Limited Commercial 41; Industrial, 4; Transport 83

Furthermore, under "American and World Records," p 588, statistical issue, Table 3 Light Plane Records, there appears the 1,650-mi World and American mark held by Barney Zimmerly The Genet engine, however, is given as the power plant, This is incorrect the engine having been a LeBlond 60

Rose to Manage Gordon Race

CLEVELAND (ohio)—William Ganson Rose has been appointed manager of the International Gordon Bennett Balloon Race and its attendant attractions which will be held here Aug. 30-Sept 1 This announcement is made by L. W Greve, president of The National Air Races, Inc, sponsor of the event, who is shortly leaving for Europe on a three-months' aeronautical tour abroad in the interests of the Cleveland Pneumatic Tool Co, of which he is the active president The National Air Races, Inc and the National Air Race & Show Corp were the two organizations which managed the 1929 National Air Races here The Gordon Bennett classic has been underwritten for $20 000

To Test Great Lakes Bomber

CLEVELAND (ohio)—The first of eighteen folding-wing bombers being built for the U S Navy by Great Lakes Aircraft Corp is to be flight-tested at the Municipal Airport here and then flown to the Naval Air Station, Anacostia, Washington, D C, where it will be subjected to tests by the Naval Trial Board Three of the craft are now ready for delivery

D. A. C. Work for Berry Brothers

DETROIT (mich)—T B. Colby, manager of Berry Brothers' Aviation Division, announces his company will now fill all finishing requirements for the Detroit Aircraft Corp

BRIEFLY

Miss Elinor Smith has obtained a transport pilot's license, having successfully passed her tests at Leroy Airport, Rochester, N Y.

New Jersey State Forest Fire Patrol has purchased a Pitcairn Sport Mailwing for use of Fire Warden Col. Leonidas Coil.

Van Lear Black, Baltimore publisher, has decided not to complete his planned flight around the world After shipping his plane from Tokio to Los Angeles, he will fly to Baltimore, and stop there

The War Department is reported to be negotiating a contract for 175 planes with Douglas Aircraft Co subject to approval of the War Department appropriation by Congress

Curtiss-Wright Flying Service has established flying clubs at Lambert St Louis Field, and Curtiss-Steinberg Airport, E St Louis Ill, to which planes are sold at cost, making possible rates of $13 per hour for dual training and $5 per hour for solo flying

Rubber "overshoes" which lace over the leading edges of airplane wings and prevent the formation of ice by exuding oil have been developed by Dr. William C Geer and Dr Merit Scott of Cornell University in co operation with the Daniel Guggenheim Fund, the B F Goodrich Co, and National Air Transport.

The Peel boat-type glider, recently successfully tested, is to be put in production at College Point, Queens, N Y, by a syndicate headed by George M Pynchon, Charles L. Lawrance, and others.

Dr R L Charles, Los Angeles, Calif, has perfected and placed on the market a new type of electrically heated flying suit of khaki cloth laminated with rubber, wool lined.

Two plant shutdowns in the West were recently prevented by plane service Gorst Air Transport prevented a serious delay in the construction of a new pulp mill at Port Angeles by transporting a large concrete mixer chute from Seattle, while a 30-lb. special type belt was recently carried by air express, delivered by Varney Air Lines from Akron Ohio, to Spokane for the Bunker Hill & Sullivan smelter

Ray H Turner, Tulsa (Okla.) representative of Philadelphia Storage Battery Co and J P Stewart of Stewart-Russ Co, distributor for Philco radio, are both covering their southwest territory by plane

The third Fairchild plane ever built distinguished for having flown to Greeley Island to meet the Bremen has been retired and its insignia, NC 32, will be framed and hung in the airport administration building at Bridgeport, Conn

Boeing Aircraft of Canada Ltd., Vancouver, B C, now has 162 men employed

National Airways System, Inc Peoria Ill has been placed in the hands of a receiver

Representatives Named

Bailing NB-3—Rodriquez Brothers, Tampico, Mexico, for Mexico; J. K. Ashley, Thomasville, Ala.

Driggs Skylark—Schlee-Brock Aircraft Corp, Detroit, national distributors.

Parks Air College—Frank C. Struif, Springfield, Ill, for Cass, Christian, Logan, Mason, Menard, Morgan, and Sangamon counties.

Fleet—Robert C Codman, Boston, Mass, will handle Boston sales for the Colonial Airways system

Bowlus Gliders and Sailplanes—Varney Air Service Oakland, Calif., distributors for the northern Pacific Coast region.

Schools and Colleges

Collier School of Aeronautics, Tulsa, Okla, is making plans for the establishment of an airport and flying school at Norman, Okla.

Central Washington Air Service, Inc Wenatchee, Wash, has opened its summer flying school under the direction of Frank Kammer

Cardiff & Peacock, Inc, who conduct a flying school at Bakersfield, Calif have opened a branch at Chandler Field, Fresno

Curtiss Wright Flying School, Columbus Ohio has been approved by the Department of Labor as a school to which foreign students may come on a non-quota immigration basis

Art Goebel School of Flying Kansas City Mo has equipped its flying field at Liberty with lights and is offering instruction in night flying

Rindge Technical School Cambridge, Mass, conducts two aviation courses in which 47 students are enrolled.

New York University Summer School July 7-Aug 15, in coöperation with the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautical Education announces a practical course in aviation for public-school teachers to consist of 60 hr class work and 30 hr of laboratory work on airplanes and engines

P. & W. Develops Oil Burning Engine

Reports received as we go to press state that the Pratt & Whitney Aircraft Co Hartford Conn has developed an aircraft engine which will employ fuel oil Details, not yet available at this writing, will be found in the next issue of Aviation.

TRADE TIPS

A communication has been received by Aviation from Enrique Valverde, Captain of the National Army, Director and Inspector General of the Aviation School, Santo Domingo, Dominican Republic, stating that there is a place in that country for an airplane manufacturer wishing to establish an air school and a plane trade. The letter reads as follows

> I have the pleasure to beg you to ascertain what airplane manufacturing company wishes to establish an aviation school in Santo Domingo and at the same time, wishes to dominate the airplane market in this country At the present time there is none in existence and I am absolutely sure that the firm establishing this business will obtain not only the profits from the instruction but will also be the first to make contracts with the Dominican Government and with private individuals I can offer them my sincere assistance and further give them all the necessary facilities both within and aside from the branches of the Government Should there be anyone interested in this matter they may address me at Escuela de Aviacion Nacional C por A. requesting whatever data they consider necessary (Signed) Enrique Valverde.

Bids will soon be received for grading the new municipal airport at Birmingham, Ala, following which hangars and administration building will be built

N B Additional information concerning trade possibilities will be found in the column headed "Airport Construction Projects"

New Firms Announced

Issoudun Aircraft Mfg Corp, Detroit, Mich; capital, $500,000, Maj Thomas G Lanphier, president, Alexander C Hamilton, vice-president, H J Hirzel, secretary, Col Henry Breckenridge, Harry R. Graham, Charles D. Ferguson, and Fred R Hegwood, directors.

This company, which is being privately financed, will manufacture a new type amphibion of metal and fabric cover construction, using Hyb-lum, a recently developed aluminum alloy The Issoudun craft, designed by Alexander C Hamilton is a four-place monoplane with two Warner Scarab engines mounted above the wing The first machine has been test flown by Lee Gehlbach, formerly of Selfridge Field The corporation has taken over the former Stinson factory building in Northville, Mich, and plans to start production shortly.

Southern Aircraft Sales Corp, Jacksonville, Fla; capital, $10,000, by I S Barnwell, I. O Barnwell, and L. D. Barnwell

Uvalde-Del Rio-Eagle Pass Flying Service, Inc, Del Rio, Tex; capital stock $12,000, by R C Henderson, Ralph Broscoe, and H. Ray; to conduct a flying school and cross-country flying service

Universal Aircraft Corp, Northern Life Tower, Seattle Wash, capital stock $90,000; by James N Whitaker, Earl W Hall, Homer H Edwards, and others, to operate airplanes and conduct an aviation school

PERSONNEL

CEDRIC FAUNTLEROY, president of Federal Aviation Corp, New York N Y, has been elected president of Consolidated Instrument Co Baltimore, Md, replacing JOSEPH LEOPOLD resigned

LIEUT. C. A. COVER, who recently inaugurated the Matson inter-island flying service in the Hawaiian Islands, has been elected vice-president of Douglas Aircraft Co, and will be in charge of sales promotion for the new Douglas amphibion He has resigned from the Army.

Lieut C. A. Cover

WARREN L BAKER, former general manager of Acme-Duco Corp, has been appointed sales manager of Glenn L. Martin Co, Baltimore, Md.

EDWARD BREWER has been appointed treasurer of Skyways, Inc, Boston, succeeding JOHN D HAUGHEY, who has resigned to re-enter the office equipment field

MILTON ANDERSON has been placed in charge of the Minneapolis terminal of Northwest Airways Inc Miss C L STEIN has been made assistant to the traffic manager of the line

HAROLD OLSEN has been named manager of the St. Paul office of Universal Aviation Schools

P. H. SPENCER, formerly sales manager of the airplane division of Curtiss-Wright Flying Service of New England, has joined the sales staff of Ireland Aircraft Corp Roosevelt Field L I, N Y

DR MAX M. MUNK, consulting engineer, who recently moved into his new office at 823 Albee Bldg, 1426 G Street, Washington, D C, will also write articles on aeronautical subjects

FRANCIS E. DUNNE formerly instructor for Parks Air College, has been made head of the dope and fabric department in the Parks and Eastman Divisions of Detroit Aircraft Corp.

Dr Max M Munk

CAPT. ARTHUR BUSSY has been appointed director of operations of Gates Flying Service Grand Central Air Terminal, New York City. He succeeds CAPT. E. BROOKS, resigned to take charge of aviation activities of Humphries Oil Interests, Denver, Colo

R V. ST JOHNS formerly construction manager for Standard Oil Co at Sacramento Calif, has been appointed engineer in charge of construction of the new Alameda, Calif, airport succeeding LYNN SCHLOSS Mr St John is also manager of the San Francisco Bay Airdrome Corp, subsidiary of Standard Oil Co

ANDREW JOHNSTON has been named sales manager for Hurley Flying Service at the Oakland (Calif) Airport

JAMES M. HAYES, JR., former motor vehicle commissioner of the State of Virginia, has been made inspector of aviation and of motor buses under the supervision of the State Corporation Commission.

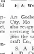
RAY ALLEN has been named manager of the Adrian (Mich) airport

CLIFFORD W MARCH has resigned as pilot for Thompson Aeronautical Corp to start a flying school at Bay City, Mich

PAUL M. HEWITT has been made regional sales promotion manager for Parks Air College with headquarters in New York.

MAJ. H A MALONEY has been appointed superintendent of the Jacksonville, Fla., municipal airport succeeding J. R GRIFFIS, resigned

FRED A WORTHEY has been appointed vice president of Axelson Aircraft Engine Co Los Angeles, Calif He has been in charge of engine sales for three years.



F. A. Worthey

J. V. C GREGORY, recently general manager of Braley School of Flying, Inc Wichita, Kan, has resigned to accept a position with Art Goebel School of Flying, Kansas City, Mo. LIEUT E. E CRUMPLAR has also resigned as director of sales and advertising for Braley School of Flying to join the sales division of Swallow Aircraft Co, Wichita, Kan

S. A. HOFFAR, L. A. DOBBIN and A. D. CRUICKSHANK have been appointed an advisory board to the airport committee of Vancouver, B. C. city council

D. H. WEBBER, formerly assistant chief engineer for Wallace Aircraft Co, division of American Eagle Aircraft Corp, Kansas City, Mo, has been made chief engineer of American Eagle, succeeding H J, STONEBURNER resigned

LEROY DRAKE, former field office manager for Rapid Aviation, Inc, Council Bluffs, Iowa, has been made director of glider sales in Iowa and Nebraska

CEYLON R BOSTWICK is president of a corporation formed to establish an airport at Wauchula, Fla

R. B. QUICK and ALBERT MEYER, Department of Commerce inspectors, have been transferred from New York and Philadelphia, respectively, to Detroit.

MAJ WILEY REED WRIGHT, Bowling Green Ky, will go to Alaska as Department of Commerce representative

AERONAUTICAL CALENDAR

May 27-30	All-New England Air Tour, starting from Springfield Airport, Springfield Mass.
June 28	Annual R.A.F Display, Hendon Eng.
July 20-Aug 7	International Light Plane Tour, starting from Tempelhof Airport, Berlin Germany
Aug 23-Sept. 1	National Air Races, Chicago, Ill.

EXPOSITIONS

April 18-26	Tri-State, Aircraft Show, Convention Hall Camden, N J L. D Odlmer, executive secretary, Hotel Walt Whitman Annex
April 19-26	Aircraft Exhibition under auspices of Montreal Light Aeroplane Club at The Stadium Montreal, Canada
May 3-10	New York Aircraft Salon, auspices Metropolitan New York Division, Distributor Dealers Section, Aeronautical Chamber of Commerce at Madison Square Garden, New York City
June 2-7	Northwest Aircraft Exposition, the Coliseum, Minneapolis-St. Paul, Minn Show Director Ray Kraus, 601 Wesley Temple Bldg., Minneapolis.
June 28-July 6	Pacific Coast Aeronautical Exposition Oakland Calif Municipal Airport
July 6	International Transportation Exposition, Warsaw, Poland
Sept 6-8	International Aero Exhibition, Stockholm Sweden.

MEETINGS AND CONFERENCES

May 5	A S.M E conference on economy of maintenance and operation, New York, N Y Fiftieth Anniversary Meeting
May 14-16	National Conference, Airport Section, Aeronautical Chamber of Commerce, Buffalo, N Y
May 19-22	Fourth Annual Technical Aeronautics Meeting A.S.M.E., Wright Field, Dayton Ohio.
June 9-12	Semi-annual meeting, A S M.E. Detroit, Mich.
July 3-5	Western States Aeronautical Conference, Medford Ore.
Sept 1-6	Fifth International Air Congress, under the auspices of the Royal Aero Club, The Hague Holland

AIRPORT DEDICATIONS

April 11-13	Curtiss Wright Airport Dallas, Tex.
April 11-13	Oklahoma City, Okla., Airport
April 19	New Bedford-Fairhaven Airport dedication and meet New Bedford Mass
April 19-25	Columbia, S C, Municipal Airport
April 21-22	Ware County Airport Waycross Ga.
May 27	Turners Falls-Greenfield, Mass
May 30-June 1	Dedication and Air Circus, Colusa, Calif Municipal Airport.
May 30-June 1	Dedication and Air Meet, Bowles Airport, Springfield Mass
May 29-31	Abilene, Tex, Municipal Airport.
June 20-21	Randolph Field San Antonio Tex

AIRPORTS AND AIRLINES

United Intensifies Campaign for N.A.T.

NEW YORK (N Y)—Following the rejection by National Air Transport directors of the proposal made by United Aircraft & Transport Corp for a merger of the former by the latter [see AVIATION for April 5], United has launched a campaign among the stockholders of N.A T in hope of inducing them to sell out individually to United This effort has been carried on by mail and through newspaper advertising, and has been given considerable significance by the announcement that United already had acquired a substantial block of N A.T stock, possibly one-third, and was very likely the largest single stockholder in the organization. The offer will expire April 15.

N A T directors met April 4 Their decision to reject United's offer was reported to be unanimous but beyond that little has been explained of the reasons for the decision The annual meeting of N A T was scheduled for April 10 If United's campaign proved successful in the meantime, it was considered likely that it may secure representation on the N A T board of directors. The arguments advanced by United to the N A T stockholders were that operating economies would be effected, a combined front would be offered to competition over the routes which would be involved, the development of passenger transportation over the transcontinental route would be more easily carried out and a sounder investment through diversification and consolidation would be realized

The situation is essentially a struggle between the Curtiss-Wright and United interests

Youngstown Airport Leased

YOUNGSTOWN (OHIO)—The city board of control has accepted the bid of the Aircraft Development Bureau for a five year lease on the Youngstown Municipal Airport The Aircraft Development Bureau is composed of the Pittsburgh-Stinson Co, Detroit Aircraft Co Bernard Air Lines, Youngstown Flying Service, Skyways Inc and the Embry-Riddle Co. The lessees under the terms of the bid propose to spend a minimum of $10 140 on the airport during the five-year period including $2 500 for grading $1 000 for seeding; $1 240 for tile work; $300 for fences; $200 to remove hazards $600 for office equipment $100 for fire extinguishers; $1 500 for hangar improvements, and $700 for a service station The reason for leasing the port was that the city was unable financially to improve it this year

Plan Randolph Field Dedication

SAN ANTONIO (TEX)—Dedication of Randolph Field, new site for the Air Corps training school (see AVIATION, March 22, page 625) will take place June 20 21 Elaborate plans are being made by the local chamber of commerce and chapter of the N A A Graduation ceremonies for a class from Kelly Field will be part of the ceremonies, together with demonstration flying by students and officers The committee in charge is under the general chairmanship of Jack Beretta, governor of the N.A.A. for Texas.

Plan Four New Lighted Airways In Pennsylvania

HARRISBURG (PA)—Four lighted and radio-beacon equipped airways in addition to the New York-Cleveland route are to be built across Pennsylvania this summer according to plans recently announced by the Aeronautics Branch and State authorities Two routes to be built and operated jointly by the State Aeronautics Commission and the Department of Commerce are Columbus-Pittsburgh - Harrisburg - Lancaster-Philadelphia, and Cleveland-Pittsburgh-Washington, D C Survey of these lines has been completed and they are expected to be in operation in September and July, respectively

Two routes to be built and maintained entirely by the Pennsylvania Commission are McConnellsburg-Chambersburg - Gettysburg - York Lancaster between the two routes indicated above and McConnellsburg-Harrisburg-Reading Allentown Easton connecting the Cleveland-Washington and the Cleveland New York routes Insofar as possible all these airways will follow either Lincoln Highway or state highways.

Eckener Inspects Airport Sites

LAKEHURST (VA)—After surveying a number of proposed sites for a dirigible base in the vicinity of Washington, D C, Dr Hugo Eckener intimated a site in the Hybla Valley near Alexandria, Va., may be selected as the American terminus for a trans-Atlantic Zeppelin line Weather statistics furnished by Lieut F W Reichelderfer of the Naval Air Station here indicated that Alexandria has the most favorable weather of any of the cities under consideration The area which would be used for the base is now owned by Washington Air Terminals Corp Sites were inspected in the neighborhood of Richmond and Baltimore also, and are still under consideration

Washington Air Bills Await Action

WASHINGTON (D C.)—Although the Watres air mail bill has been placed upon the unanimous consent calendar of the House it may not come up for consideration until April 21 The first and third Mondays of each month are reserved for "unanimous consent" bills, but as the Watres measure is far down the list the likelihood of its being taken up on the first Monday appears somewhat doubtful.

Meanwhile the Bingham aircraft accident bill was still resting in the Senate Commerce Committee as this dispatch was written. There does not seem to be any disposition on the part of the committee to expedite the passage of the bill After hearing a letter from Assistant Secretary of Commerce Clarence M. Young in which the practical aspects of an amendment to the bill, proposed by Senator Bratton, were pointed out, the committee deferred action, awaiting a conference between the chairman of the committee and Senators Bingham and Bratton

Senator Bingham's bill had proposed the compulsory investigation and public report by the Department of Commerce of all accidents resulting in serious or fatal injury An amendment was offered by Senator Bratton substituting "personal injury" for "serious or fatal injury" Secretary Young is believed to have asserted in his letter to the committee the fruitlessness and monetary waste which would follow such a course, necessitating the investigation and publication of the facts regarding such minor injuries as scratches and bruises

Another phase in a second amendment added by the sub-committee which is regarded as undesirable is that prohibiting the removal of evidence from the scene of an accident within three days thereafter, except by permission of a Department of Commerce inspector In many parts of the country, it has been pointed out this would result in wrecks being left on airports for three days before an inspector arrived.

Rapid Opens New Service

KANSAS CITY (MO)—Rapid Airlines started a passenger service between Kansas City and Omaha April 1 This is the first of several new air passenger lines the company proposes to launch The Omaha-bound plane leaves the Kansas City Municipal Airport daily at 9 a m, and leaves Omaha at 4 p m Both north and southbound trips require about 1 hr 45 min The line also operates passenger service between Rapid City-Pierre Huron S D

AIRPORT CONSTRUCTION PROJECTS

South

VICKSBURG, Miss., is faced with the problem of removing a cemetery in order fully to develop its municipal airport. Unless permission is obtained to remove the graves or to build the runway over them proper extension of the runway will be impossible.

Davis Air Lines, operating a passenger service between Atlanta and Birmingham, will erect a $20,000 hangar at Candler Field, Atlanta Municipal Airport. Southern Air Transport has completed plans for a $25,000 hangar of steel construction. Beeler Blevins, whose hangar recently burned, has bought the old hangar of Southern Air Transport and plans to renovate it.

Work has been started on a 60x60 ft. hangar costing $8,000 at Byrd Field, the Richmond (Va.) Municipal Airport. The hangar is being built by the city and will be leased to the Richmond Air Transport and Sales Corp. which has been given exclusive concession to sell oil, gasoline, parts and service at the airport.

Following unsuccessful negotiations with owners of land included in the Fourche Dam tract selected for the Little Rock (Ark.) municipal airport, condemnation suits are to be filed to force the owners to sell. The tract includes 583 acres and the appraisal price has been set at about $100,000.

Air Services, Inc., has established an airport fourteen blocks from the Waco (Tex.) Post Office. The $30,000 construction program, underway includes fireproof hangars, club rooms, offices, mechanical department, and boundary and beacon lights. Clearing and leveling the field has been completed.

About $500,000 is expected to be invested in a new seaplane base at Miami, Fla., which will be built and occupied jointly by the Pan American Airways and New York, Rio and Buenos Aires Line.

Improvement plans for the El Paso municipal airport call for lighting the field, doubling flood lights and placing boundary lights, building concrete circle marker, and acquiring additional land.

Fayetteville, Ark., will vote May 6th on a $20,000 bond issue for purchasing additional land for a municipal airport and for equipping the field.

The lighting system of the Charlotte (N. C.) municipal airport was installed by the Crouse-Hinds Company, Syracuse, N. Y.

Officials of McComb, Miss., are considering the purchase and development of an airport.

A new hangar, costing $4,800 and housing four planes, has been completed at the Denton (Tex.) Municipal Airport.

A new office building will be constructed at the Sweetwater (Tex.) Municipal Airport.

A new 60 x 80-ft. hangar has been completed at Bonham (Tex.) Municipal Airport.

A landing field has been established by the city of Sierra Blanca, Tex.

An intermediate landing field of 85 acres has been selected at Cleburne, Tex.

The Electra (Tex.) landing field, west of Electra, Tex., is ready for use.

Abbeville, La., is considering the establishment of an airport.

East

The Buffalo (N. Y.) Aero Club has completed negotiations for a flying field near Holland, N. Y., to be used for glider activities.

A change in the layout of the so-called New York City Airport project at Flushing, L. I., has been ordered to permit extension of the existing runways.

The towns of Amherst and Wolfville, N. S., are making preparations for the establishment of an airport at their respective localities.

C. Dallas, Inc., is planning to develop the Finger Lakes Airport at Waterloo, N. Y. Lights and a new hangar are to be installed.

Bids are being received for resurfacing at the Bridgeport (Conn.) Airport operated by Curtiss-Wright Flying Service.

A restaurant is to be installed and the flying field surface is to be seeded at the Springfield (Mass.) airport.

A movement has been started to erect a hangar at the Boston Municipal Airport by the city.

North Central

Bids submitted for the construction of the administration building at the Wold Chamberlain Municipal Airport, Minneapolis, exceeded the $40,000 original appropriation by $14,000. A fund of $17,000 has been made available with the understanding that this amount would be taken from the allowance for grading of the field.

Permission to erect a hangar at the Williamson-Johnson municipal airport, Duluth, has been requested of the city council by a group including E. O. Stovern, C. J. Yoho, M. L. Boshart and H. A. Carlson.

A movement is on foot for the city of Fond du Lac, Wis., to buy the Fond du Lac Airport, now privately owned. The purchase price of the property probably would be about $38,700.

The lighting system at Pontiac Municipal Airport was installed by the Crouse-Hinds Company, Syracuse, N. Y.

Central

Construction has been started on a new $25,000 steel, brick and glass hangar at the Paul Baer Municipal Airport, Fort Wayne, Ind. The building will have doors on three of its four sides. The front door will have an opening 106 x 20 ft. and the side doors will measure 54 x 14 ft. On the second floor of the hangar will be a lounging room for pilots, offices for various officials and a room for school purposes. The airport includes 220 acres.

Fairbury (Neb.) City Council has passed an ordinance authorizing special election on June 3 on the question of issuing $30,000 in bonds for the development of a 160-acre tract as a municipal airport.

Mid-Western Aircraft Co., of Joliet, Ill., is about to begin construction of a steel 60x80x16-ft. hangar on its thirteen-acre flying field.

A transmission line to supply electricity to the Aurora (Neb.) Airport has been authorized.

Marblehead, Ohio, is preparing to build an airport.

Suit Over Herrick Airport Goes to Court

CLEVELAND (OHIO)—Final arguments in the suit of Swetland vs. Curtiss Airports Corp. et al were made here April 2 and the case submitted to the court. Harry Hotchkiss and John A. Haddon presented the case for the defendants against the argument of Charles Hine for the plaintiff. Swetland, a property owner whose home adjoins the Herrick Memorial Airport site, had filed suit for an injunction against the airport, alleging that the flight of planes taking off and landing across his property constituted trespass and a nuisance.

Evidence was submitted that Curtiss intended changing the location of its runways and establishing field rules prohibiting take-offs and landings being made over the Swetland property. Because of this evidence it is believed the trespass charge will not be considered of paramount importance in the case. Judge George P. Hahn, federal judge of the northern district of Ohio has not indicated what his decision will be, nor when it will be rendered.

Studies made at the airport have shown that for only 4 per cent of the time would the prevailing winds necessitate take-offs over the Swetland property and that bad weather has always been experienced during these periods.

To Inspect Airship Base Sites

WASHINGTON (D. C.)—Selection of a Pacific Coast naval airship base will be delayed at least until June, when members of the House committee on naval affairs, with Secretary of the Navy Adams and Rear Admiral Moffett, chief of the Bureau of Aeronautics will visit the proposed sites. Camp Kearney, near San Diego, and Sunnyvale, near San Francisco are the two most prominently mentioned but others are still under consideration, according to a recent statement by Representative Britten of Illinois, chairman of the House committee.

P.A.A. Speeds Mail Service to Argentina

NEW YORK (N. Y.)—Pan American will offer a seven-day mail service between this city and Buenos Aires and Montevideo beginning April 26, it has been announced. Speeding up of this service from the eleven day period now required is made possible by the opening of night air mail service between Atlanta and Miami and a change in schedule between Miami and the Canal Zone. Previously, the mail plane would stay over night at Belize and Managua. The new plan will be for the mail plane to get to Havana on the afternoon the consignment reaches Miami, stay over night there and then push through to the Canal Zone the next day.

The schedule for this seven-day service is to be as follows:

Leave New York 5:05 p.m.; arrive Miami 1:45 p.m.; leave Miami, 2 p.m.; arrive Havana 4:15 p.m.; leave Havana 5 a.m.; arrive Cristobal 4 p.m.; leave Cristobal 6 a.m.; arrive Elena Ecuador 6 p.m.; leave St. Elena, 5 a.m.; arrive Lima, Peru 5:50 p.m.; leave Lima 5 a.m.; arrive Arica, Chile 3:05 p.m.; leave Arica 6 a.m.; arrive Santiago, Chile, 5 p.m.; leave Santiago 8 a.m.; arrive Montevideo, Uruguay, 6 p.m.

Returning northward, leave Montevideo 6 a.m.; arrive Santiago 4:45 p.m.; leave Santiago 8 a.m.; arrive Arica, 8 p.m.; leave Arica, 8 a.m.; arrive Lima, 4:30 p.m.; leave Lima, 7 a.m.; arrive Elena, 6 p.m.; leave Elena, 6 a.m.; arrive Cristobal, 4 p.m.; leave Cristobal, 8 a.m.; arrive Nicaragua, 3 p.m.; leave Nicaragua 6 a.m.; arrive Havana, 2 p.m.; leave Havana 2:45 p.m.; arrive Miami, 5 p.m. This will put the plane in New York at 5:15 the next morning.

Plan New Mail Line

ST. LOUIS, (MO.)—A new night air mail service between St. Louis and Evansville, Ind., connecting with the main air line between Chicago and Atlanta, Ga., and other routes throughout the Southeast, will be inaugurated on April 1, it has been announced.

S.A.F.E. Completes First Year of Operation

TULSA (OKLA.)—Southwest Air Fast Express Inc., completed one year of operation March 31. During that time, company planes were flown 934,649 mi., carrying 25,654 passengers over lines running from this city to St. Louis, Kansas City, Midland, Tex., and Dallas, Tex. The company operates ten Wasp-powered Ford planes on regularly scheduled services, and has available four Lockheed planes for charter trips. Property owned by S.A.F.E. is now valued at nearly one million dollars, including a hangar and administration building which cost $150,000.

In a recent statement, President Erle P. Halliburton reiterated his belief that successful commercial operation of airlines under present conditions must depend upon government contracts, and he advocates sending regular first-class mail via passenger transport lines instead of sending only extra postage air mail.

Air Mail Statistical Report for January, 1930

Route Number and Termini	Length of Route (Miles)	Frequency (Rd. Trips per Month Scheduled)	Miles in Service — Scheduled	Miles in Service — Actually Flown	Total Weight of Mails Dispatched (Pounds)	Amount Paid to Contractor
1 Boston-New York	192	26	11,328	8,813	6,912	$20,735 62
2. Chicago-St. Louis	278	62	34,472	26,650	3,618	9,117 27
3. Chicago-Dallas	1,059	62	129,653	89,908	24,677	74,032 50
4. Salt Lake City-Los Angeles	600	18	75,730	58,145	63,169	190,701 87
5. Salt Lake City-Pasco	330	62	67,015	37,839	17,383	32,756 31
8. Seattle-Los Angeles	(a) 1,141	31	67,142	56,606	18,401	31,948 62
9. Chicago-Minneapolis	303	93	78,678	71,948	14,792	39,027 40
11. Cleveland-Pittsburgh	121	62	15,408	11,434	3,267	9,808 44
12. Cheyenne-Pueblo	199	31	12,726	10,366	3,390	4,471 34
16. Cleveland-Louisville	345	31	23,002	17,029	4,290	3,233 27
17. New York-Chicago	718	62	114,994	81,245	107,120	91,649 71
18. Chicago-San Francisco	1,932	62	258,111	228,617	140,607	273,228 31
19. New York-Atlanta	763	31	67,002	45,200	27,376	82,177 44
20. Albany-Cleveland	446	77	(b) 128,686	24,186	4,958	3,301 86
21. Dallas-Galveston	320	31	29,054	18,019	2,193	6,336 50
22. Dallas-Brownsville	179	31	32,962	25,763	6,517	18,833 77
23. Atlanta-New Orleans	483	31	30,016	26,831	6,889	12,033 71
24. Chicago-Cincinnati	270	62	34,030	21,701	4,116	6,030 61
25. Atlanta-Miami	754	31	46,748	41,486	11,340	16,849 13
26. Great Falls-Salt Lake City	489	31	39,774	37,121	3,284	13,677 18
27. Bay City-Chicago	773	26	47,030	35,639	11,115	9,897 43
28. St. Louis-Omaha	403	62	50,261	42,889	10,149	8,201 01
29. New Orleans-Houston	319	31	19,770	19,222	4,063	4,849 10
30. Chicago-Atlanta	768	31	47,616	41,233	6,898	5,380 76
32. Pasco-Seattle	449	31	28,616	19,099	7,272	654 50
	14,386	1,090	1,374,696	1,103,337	518,398	$1,011,840 69

(a) Southbound trip not operated between Seattle and Portland. (b) Round trip daily except Sunday between Buffalo and Cleveland discontinued Jan. 15, 1930. Correction—December report—Route 8 total weight mail dispatched 23,526 instead of 22,200 lb. Supplemental payment—Route 9, December, 4 lb. 8 oz. $12.17.

NOTE—Close comparisons between the various air mail reports issued from time to time will reveal slight discrepancies in various figures. These are not errors, strictly speaking, but are due to various readjustments which have to be made from month to month after the preliminary figures have been released.

Special Air Mail Stamps For Zeppelin

WASHINGTON (D. C.)—A special series of air mail stamps will be issued by the Post Office Department in connection with a forthcoming European-Pan American flight of the Graf Zeppelin, it was announced by Postmaster General Brown on March 31. The series will consist of three stamps of the denominations of $.65, $1.30 and $2.60, which represent the rates applying to letters and postal cards to be carried by the Graf Zeppelin.

The $2.60 rate applies to letters mailed in the United States for the round trip—New York to Friedrichshafen by steamer, Friedrichshafen, Pernambuco and Rio de Janeiro to Lakehurst by air. The letter rate on the first leg of the trip from New York to Friedrichshafen via Seville, Spain, will be $1.30 return dispatch via regular steamship mail to New York, and thence by air mail or other means to point of address.

For postal cards the rate on the round trip will be $1.30 and the $.65 rate applies to post cards mailed in the United States which will take the flight on the last leg of the trip from New York to Friedrichshafen via Seville, Spain. These rates will include air mail treatment, coming and going, in the United States.

The issue will consist of one million stamps of each denomination and there will be no reissue. Each denomination will have a separate design. All of the designs will be distinctive and artistic, depicting the Graf Zeppelin in flight. Complete description of the stamps, colors and the date and place of first sale will be announced later. Further information will be given as to how mail will be handled and where stamps may be secured. It was also announced by the Postmaster General that a very close working agreement has been made with the Graf Zeppelin company for the better handling of covers mailed in the United States.

N. Y. Air Police Begin Patrols

NEW YORK (N. Y.)—New York City's air police force went to work March 30, with four American Savoia-Marchetti amphibions for regular duty and a Keystone Commuter for reserve. Licensed pilots of the police department, trained at Roosevelt Field during recent months, take off hourly during the day beginning at 7 a.m., for patrols of 1 hr. duration each. North Beach Airport in Queens is the base and to it are attached 40 policemen, fifteen of whom are pilots. The patrol cruises over the Hudson and East Rivers and the harbor at about 1,500 ft., observing the conduct of general flying in and about the city and any irregularities on the surface which might be noticed. A code of air regulations for the city [See AVIATION for March 15] is under consideration.

Airway Briefs

At Tulsa, Okla., 400 employees of the city's four airports and two airplane factories receive a monthly payroll of $80 000. Total investment in aeronautical enterprises in Tulsa is said to be about $5,000,000.

During March, 3,160 passengers were carried by planes arriving at or leaving Oakland Municipal Airport as compared with 2 738 the previous month.

Bids for construction of intermediate fields and installation of beacons on the Kingsville-Houston section of the Brownsville - Houston airway were opened April 11 at the office of the chief clerk, Division of Supplies Washington, D. C.

Vern Bookwalter has purchased the Inland Eaglerock hangar at Felts Field Spokane, Wash., and plans to establish an overhaul depot for aircraft and engines.

The fight conducted by attorney Charles Ruth against the $450,000 airport bond issue voted last year in Oklahoma City is to be carried to the U. S. Supreme Court, after the issue was held valid by the State Supreme Court.

The commission of the District of Columbia has submitted to the Senate a favorable report on a bill to provide a commercial airport for the District by uniting Hoover Field, Washington Airport, the property of the government experimental farm, Columbia Island, and the filled in channel between island and mainland. There is still considerable opposition to the bill.

Love Field, Dallas, Tex., numbers eighteen operators of which six are transport companies, five schools, two factory branches, and five service operators.

Continental Air Express has inaugurated week-end service to Reno, Nev., from Los Angeles and San Francisco.

C. Dallas Inc., operator at Buffalo Municipal Airport, has leased the Finger Lakes Airport at Geneva, N. Y., for six years, planning to operate a taxi service and open a school.

Harrisburg (Pa.) Flying Service, Inc., has applied to the Pennsylvania Public Service Commission for permission to operate a passenger and freight transport service.

Henry T. Sharp of Asheville, N. C., has offered 200-300 acres of land near Fort Caswell, on behalf of the owners, to the state for development and use as an airport. The offer is made frankly in the hope of increasing the value of surrounding property.

Colonial Western and Continental Air Lines have adopted unified schedules with connections at Cleveland, Ohio, to provide through service from Albany, N. Y., to Louisville, Ky.

Resolutions endorsing the Watres bill, recommending enactment of state laws to regulate aircraft, and to provide further laws for marking and regulation of airways, will be voted on at the annual meeting of the U. S. Chamber of Commerce at Washington, D. C., April 28 May 1.

San Diego Council has been asked to limit the height of buildings which may be erected in the vicinity of Lindhergh Field

B. B Meek, California State director of public works, has called a conference to consider use of gasoline tax refunds made to airplane companies for the development of airports and airways. The amount now averages $60,000 annually.

Following the setting of a rental rate of $12.50 per 1,000 sq ft for space at Candler Field, Atlanta, plans for erection of two new hangars have been announced.

Coast Air Lines, Inc., has purchased the lease of the Everett (Wash.) Airport and a considerable amount of operating equipment from Commercial Air Transport Co. of Everett

Colonial Air Transport reports that 1 218 paid passengers were carried between New York and Boston during March as compared with 770 in February and 277 in January

C. W. H. Smith, general traffic manager of Western Air Express, Prof E. W Hill, University of Southern California, Robert F. Craig, manager of Fairfax airport, R. H. Lee, Department of Commerce, and J. W. Sahm, traffic manager of Universal division of American Airways, Inc., spoke at the meeting of the aeronautic section of the Central States Safety Congress, Kansas City, March 24-25.

About 40,000 mi were flown by West Coast Air Transport planes during the first three months of 1930, bringing the company's total mileage to 218 928, all without damage to plane or injury to pilot, passenger, or freight

Rockford, Ill., defeated a proposition to establish a municipal airport by a vote of 10 625 to 4,192

Margaret Perry, of Beverly Hills, Calif., has purchased Culver City airport from W. G McAdoo, Jr., and plans to equip it as an airport for women.

A Claude Neon beacon has been installed at the DuPont private airport near Wilmington Del

Canadian National Express Co and Canadian Pacific Express have made arrangements to route express shipments over their lines for trans-Atlantic passage and delivery in Europe via Imperial Airways, Air Union, Luft Hansa and K L M

An addition 15 x 25 ft will be built on the hangar office building at Springfield Ill to house a weather bureau

Western Air Express has accepted delivery of two 40 B4 Hornet powered Boeing planes for use on the Los Angeles-Salt Lake route.

Thompson Aeronautical corp is considering planes for year-round passenger service between Detroit and Cleveland, using Keystone-Loening amphibions. The schedule for this summer will be increased to four or five round trips daily.

Mills Field Purchase Looms

SAN FRANCISCO (CALIF)—Steps are being taken by the board of supervisors of this city to negotiate the purchase of a tract of land of approximately 1,150 acres of the Mills Estate, a portion of which is now occupied by Mills Field for the San Francisco municipal airport. A resolution authorizing the finance and airport committee to offer the Mills Estate $1,050,000 for 1,150 acres has been adopted by the board of supervisors. The resolution provided that the city shall acquire the 1,150 acres in ten parcels and shall pay for it in ten annual installments of $105,000. The city attorney and city engineer are participating in the negotiation with Ogden L. Mills,

To Study North Route Weather

MONTREAL (QUE.)—Meteorological studies for the proposed Montreal-Paris airway via Scotland, Faroe Island, Iceland and Greenland are to be undertaken by Dr Constantin Dumbrava this summer. On July 15 he and three companions will establish headquarters at Scoresby Sound, Greenland, and flights to obtain data will be undertaken from there using a light Potez plane. A radio station will be established and will work in co-operation with the Canadian government station VAA, at Ottawa. If preliminary tests are successful, similar bases with radio equipment will be established every 500 mi on the proposed airway.

Test Sprinkler System at Detroit

DETROIT (MICH.)—Tests of an automatic sprinkler system installed in the new 250 x 1 017 ft hangar at the municipal airport here were reported as entirely satisfactory by Assistant City Engineer W. J. Wallace. This is the "deluge system" installed by Automatic Sprinkler Corp., Youngstown, Ohio, using dry pipes and rate-of-rise meters to start the flow of water in case of fire. The hangar, which will be used to house exhibitions in the Detroit Aircraft Show, is supplied with water through a 24 in main and water plugs have been installed in the floor as well as under the ceiling of the structure

Gets Award For Mail Plane Crash

PAPILLION (NEB.)—A jury in district court here has awarded damages of $500 to Mrs. Esther Watson, who claimed she suffered a nervous breakdown and physical injury as the result of a mail plane falling onto the roof of her home near Fort Crook Airport Jan 29. The verdict was directed against the Boeing company. Mrs. Watson's husband is suing for $3,000 damages to his house and farmyard, and her father-in-law for a similar amount on the claim that the same plane struck an antena on another house, pulled a radio set from the table and hurled it against his fractured leg

FOREIGN ACTIVITIES

Australian Aviation Shows Marked Growth

MELBOURNE (AUSTRALIA) — Substantial growth in all phases of aeronautical activity is indicated by a statistical summary of aviation operations in Australia published in the Jan 31 issue of *Aircraft*. The figures cover number of pilots and aircraft and mechanics, established airways and all commercial operations since 1921 or 1922. Figures for the most important items for 1928 and 1929, are reproduced below

	1928	1929
Registered aircraft	122	215
Aircraft owners	70	124
Licensed private pilots	182	278
Licensed commercial pilots	108	157
Licensed mechanics	182	228
Government airports	56	59
Government emergency fields	4	119
Other licensed airports		28
Transport operations (subsidized lines)		
Mileage of subsidized airways	3 507	5 404
Miles flown	513,096	665,247
Paying passengers carried	4 350	7,821
Paying passenger-miles	545,296	1,332,262
Freight carried (lb)	130 541	211 661
Transport operations (all lines)		
Miles flown	1,491 555	3,410 078
Passengers carried	10[illegible] 620	190 555
Freight carried (lb)	144 955	224 697
No of letters carried	399 085	501 300

Of the 215 registered aircraft 16 are American, 5 are French, 4 German, and the rest English or Australian.

Transport Base in Japan

HANGARS OF THE Japan Air Transport at Tachikawa 15 mi from Tokyo. A description of the company, its equipment and operations, was printed in the March 22 issue of AVIATION

French to Carry Italian Mail

PARIS (FRANCE)—Italian air mail for points on the French Marseilles-Athens-Beirut-Bagdad route will be sent via Air Union, which operates the line, according to an agreement recently reached between the two countries. Stops in Italy are regularly scheduled on this route so that the mail may be picked up without change of schedule.

France Gains Seaplane Record

PARIS (FRANCE)—Using a Latecoere 28 monoplane, Test Pilot Prevost recently established a new world record for speed over a 500-km. course with a 2,000 kg load. The record now stands at 126 m.p.h. The former record of 111.48 m.p.h. was held by R. Wagner of Germany, who used a Dornier Super Wal. The Latecoere was fitted with floats and an Hispano-Suiza watercooled engine of 650 hp. Prevost also flew the 100 km course with the same load at the speed of 137 m.p.h. The record for this was made over Long Island Sound recently by Boris Sergievsky at a speed of 144 m.p.h. Wagner's plane was powered with engines totalling 1 920 hp and Sergievsky's totalled 1 050 hp

Start Brazil-Germany Mail

RIO DE JANEIRO (BRAZIL)—Eight-day plane and ship mail service to Berlin was inaugurated here March 21 by Condor Syndicate, in co-operation with Luft Hansa. Condor Syndicate planes leave here in time to overtake steamers and transfer mail at Fernando Noronho, easternmost island off the coast. The ships carry the mail to Lisbon, Portugal, where it is picked up by Luft Hansa planes and flown to Berlin in 24 hr. This is the second plane-ship service across the south Atlantic, the first being operated by Compagnie Generale Aeropostale

Panama Gives Scadta Contract

ANCON (C. Z.)—After a long delay in negotiations the Panama government finally has signed a mail contract with Scadta for the transportation of air mail to Colombia and Ecuador. This will give Isthmian residents an additional opportunity to get fast service on all mail to cities in these countries. Scadta has been operating its lines to Panama for almost a year and planes leave twice a week for Colombian and Ecuadorian cities. Mail is also carried to Colombia and Ecuador over the Pan American System

English Air Debate Shows Industry Status

LONDON (ENGLAND)—A review of the past year's accomplishments in English aviation and plans for the future is afforded in the air estimate speech made in the House of Commons March 18 and in the debate which followed it. As has been stated previously [see AVIATION for March 29], the estimate for 1930 31 is approximately $89 250 000. This represents an increase of about $4 450,000 over the estimate for last year and the supplementary estimate which was added after the original vote. It is pointed out in some quarters, however that the ratio of increase over a period of years is declining.

Speaking first of the Royal Air Force's appropriations, Mr F. Montague, undersecretary of state for air, made the point that British air policy and expenditure have been quite moderate in comparison with sums spent by other leading nations and that on the basis of metropolitan strengths the English have less than a half-power-standard compared with their nearest neighbor. He emphasized the economy effected by the substitution of R A F units for garrisons throughout certain parts of the empire.

Former Chief Speaks

In the debate following the speech, Sir Samuel Hoare, who was secretary of state for air in the Baldwin ministry, urged that a study be made of extending the practice of substitution of R A F units for ground troops, on the principle that the R A F. should not constitute an additional military arm and thus be merely an additional expense, but should justify itself by replacing the older and more expensive and less efficient forms of garrisons. In reply it was stated that the matter is now before the cabinet

Referring to technical developments, Mr Montague spoke of studies of the problem of noise curtailment in passenger transports. It has been found that the noise, derived chiefly from the engine and propeller, in the cabin of an airliner is 1,000 times as great as in the car of an express train, although the ear does not register that difference. The problem of aerodynamic interference of one part of a plane on another has been studied, also. In this field it has been found that the interference set up by all the parts in the assembled whole produces greater drag than the sum of the drags of the individual parts calculated separately

Work was started under last year's estimates on a compressed air wind tunnel for the National Physical Labo-

(Concluded on Page 782)

Foreign Briefs

La Star is the name of a new company organized by Societe Generale Aeronautique to run an air taxi service and carry newspapers between Paris and seaside resorts Seven Nieuport and three Fokker planes have been ordered, with Lorraine engines No subsidy is asked for.

The widow of M Clavier mechanic killed in the trans Atlantic flight attempt made by Rene Fonck three years ago has sued his backers for a life pension for herself and children

Capt Charles Kingsford-Smith has announced that the monoplane Southern Cross, used in his famous flights to Australia, is for sale

A squadron of British night bombing planes controlled entirely from the ground by radio recently made a successful flight of 400 mi, including landings by means of a weighted wire which causes the plane to flatten out in a glide when the wire touches the ground

A 5-hr test flight, the first this year, was made by the Graf Zeppelin April 3 Several minor changes have been made in structure and details

It is reported that Avions Farman will manufacture Klemm light planes in France under license

Societe des Moteurs Renault is testing a new 120 hp radial engine and has modified the design of its 250 hp engine to make it produce 300 hp Moteurs Hispano-Suiza have tested a new water-cooled Vee engine giving 650 hp at 2,200 r p m, weighing 839 lb

L'Helice Metallique, a firm with capitalization of $83,400 founded by Mm Paulhan and Pillard, will manufacture metal propellers with free-wheel mounting

Tests of a four-bladed variable pitch propeller invented by Captain Leparmentier are now being made at Toussus-le-Noble field

The new English aircraft carrier H M S Glorious is reported to have attained a speed of 35 knots on her trials making her ½ knot faster than U S S Lexington

R N Chawla has won the prize of $2,500 offered by the Aga Khan for the first native Indian to fly between India and England He covered the 5,000 mi in eighteen days

Membership of the German Aviation association increased from 11,000 in 1925 to 45,000 in 1929 The association has 60 touring balloons and 133 planes. Of the members, 500 are qualified pilots.

Swiss air transport companies carried 6,743 passengers on scheduled flights and 6,734 on special excursions during 1929 as well as 112,500 lb of mail and 308,475 lb of freight

Raab-Katzenstein Co plans to establish a branch factory at Marienbad to promote export to Yugoslavia and other Balkan countries

It is expected that the two Do X planes under construction for the Italian government will be ready for testing in May They will be powered with Fiat engines

Robert Kronfeld has been officially credited by the F A I for four world's gliding records made July 20 1929 at Wasserkuppe, when he reached a height of 2,281 m and covered a distance of 142.47 km and July 30 when he reached a height of 2,589 m and covered 149.42 km. (8,500 ft and 93 mi.)

Polskie Linje Lotnicze, of Poland, carried 14,432 passengers, 119,845 lb of mail, and 461,000 lb of freight last year

Budget of Netherlands East Indies provides for a purchase of Navy planes and flying material amounting to $7,200,000, over a period of 10 yr and an expenditure of $5,200,000 for the Army air service for 10 yr as well as $2,000,000 to be spent immediately on airports

There are at present sixteen airports in Belgium of which eight are exclusively military and four others are state-owned There are twelve airports and 77 emergency fields in Belgian Congo.

Rohrbach Aviation Works has been sold to Dr Rohrbach by the German government on a special payment plan He also receives a loan of about $50,000 for payment of salaries and creditors

License fees for private and limited commercial planes in Peru have been reduced to $20 annually and landing fees to about $ 80 per landing

Mexican Central Air Line, with a capital of $100,000 subscribed by American and Mexican business men, will apply for permission to operate daily passenger mail, and express service between Monterey, Laredo and San Antonio, Tex using Travel Air and Lockheed planes Carlos Gonzalez is president

Mazatlan Airways, operating between Mexico City, El Paso and Brownsville, Tex., together with the cities concerned, will spend $800,000 to expand its service Of this amount $500,000 will be invested in 21 planes

Col Pablo L. Sidar has purchased a Wasp-powered Emsco plane for a proposed flight from Mexicali, Mexico, to Buenos Aires

A new civil and military airport has been built at Toluca, Mexico

Pickwick-Latin American Airways is planning to inaugurate a sight-seeing service in Mexico City

Continue Clerget Diesel Tests

PARIS (FRANCE) — Test flights with the 100 hp Clerget heavy oil engine are being continued at Villacoublay Field A series of cross-country flights through France is to be undertaken soon. The inventor is working on a second type of heavy oil engine which is expected to be ready in May This model is to include a number of improvements over the older model the weight per horsepower will be reduced and an output of 200 hp is expected

English Air Debate

(Continued from Page 781)

ratory, and it was to be completed under the estimates being considered. The value of the compressed air tunnel of the N A C A at Langley Field was mentioned in support of this plan Mr Montague championed, also, the need of a full-sized wind tunnel capable of accommodating a complete working plane, such as is done in the United States Among the other research activities mentioned was the development of a wireless rotating beacon, similar in purpose to the radio range beacon in the United States The English device is being subsidized by both the Air Ministry and the Board of Trade, the latter being interested in its adaptability to shipping.

Civil aviation would receive an increased appropriation, chiefly on account of the additional subsidy required to promote the proposed airline to Cape Town. Good news for the light plane clubs was contained in the statement that the estimates provide for assistance for them on the same scale allotted to the National Flying Services, Ltd. This means that about the same arrangement as in effect heretofore would be continued. Many of the original flying club agreements run out this year and there had been considerable speculation as to amount and nature of support which might be expected from the government

Airway Progress Reported

Progress on the development of the airline to Cape Town has been such that it is expected service between Cairo and Tanganyika may be started this fall and that through service to Cape Town may be in effect by the spring of 1931 Ground organization is being pushed on the extension of the England-Australia airline eastward from Karachi and Delhi It was stated that ground work between Karachi and Calcutta should have been completed by the first of this month and that it is hoped operation as far as Rangoon, Burma may be possible by fall It was pointed out, in answer to certain questions in the debate that negotiations still are in progress between the English and Italian governments regarding operations over the latter country It will be recalled that such operations were cancelled following a disagreement last winter between the two countries regarding compensation for the service.

Faith in the airship program was expressed and it was brought out that the addition of another bay to the R 101 has not been undertaken to provide for any anticipated defect Mr Montague stated that "the bay, with the consequential extra lift, is found to be possible not because of defect but because of the satisfactory strength which the airship's tests have disclosed" It is admitted, however, that this extra lift will cut down considerably the margin of speed to compensate for the possibility of unfavorable conditions on the reverse trip of a flight to the East

THE BUYER'S LOG BOOK

Rainbow Neon Beacon

One of the recent developments in Neon lighting is the Rainbow Type "C" beacon produced in the laboratories of Rainbow Light Inc, Long Island City, N Y The design is characterized by simplicity and compactness, resulting from the use of a high intensity tube. The beacon consists essentially of a base housing the transformers, a row of luminous tubes mounted vertically above the base in a circle around the central standpipe two reflectors, a top casting supporting the upper ends of the tubes, and a top or zenith light mounted above this casting. This last burns continuously, serving to hold the pilot's attention during the "Off" periods of the tubes

Type C Neon Beacon

The tube unit is small enough to be handled by one man and there are no motors, brushes or automatic lamp changers The only moving part is a small motor driven flasher, which can be mounted within the hangar thereby protecting it from severe weather and making it accessible. This is adjusted to give "Off" and "On" periods in the ratio of 40 to 60, or a simple Morse Code signal According to the manufacturer the tube has a light output of approximately 16 lumens per watt. Its life nearly approaches that of the commercial sign tube. The beacon measures 7 ft 4 in x2 ft 9 in overall. It is so designed that it can be knocked down for shipment and installed without requiring special Neon knowledge

G. E. Card Compass

The General Electric Company announces a direct-reading card compass for aircraft for use where the remote indicating type is not essential. This card compass is marketed as an addition to the line of magneto compasses made by the company and is adapted for use with small aircraft because of its light weight and low price.

Its design embodies a spherical aluminum bowl filled with a liquid and containing a graduated dial card mounted on a jewel pivot The compensating scheme used to correct for local magnetic disturbances consists of an adjustable magnetic mechanism which eliminates the old arrangement of needles in a drawer, is positive in adjustment and convenient to handle.

G. E. Compass

A ground glass lens is provided in front for reading the position of the card with respect to a fixed "lubber line" and two expansion chambers at the top allow for changes in volume of the liquid in the bowl, caused by temperature and altitude variations An electric light is placed between these two chambers to illuminate the front edge of the card The intensity of the light can be varied by the pilot and the socket is so located that he can change lamps in flight, should the necessity arise. This illumination feature is standard but can be omitted Its parts are readily detachable in the field One model is supplied with electric illumination and a second is without this illumination. The source of electric supply can be a storage battery, dry cell or a generator. A correction card is included with each compass and the entire instrument is mounted on a three-point suspension which is well damped and shock absorbing. It can be suspended from above, mounted flush with an instrument board, attached to the top of a flat base or mounted in front of a spar.

Structural Units

Metal aircraft structural units adaptable to all types of airplanes are now in production at the plant of Wm E Marchant, Inc, Detroit, Mich The products of the company include wing ribs, ailerons, fairing, replacement ribs, and leading and trailing edge. A conventional type Marchant rib structure employs a special "T" section of thin gauge metal from .005 in to .018 in thick both for cap strips and trussing The trussing is notched, slitted and folded by machine and is a single piece of "T" material in front of, between, and in rear of both spars The entire structure is assembled in a patented aluminum jig after which it is riveted by an automatic feed power driven rivet setting machine Each joint is designed to withstand an approximate overload and where unusual strength is required, gussets or reinforcement "T" sections are used. This type structure permits the use of stainless steel, cold rolled steel, hyb-lum and other aircraft metals

Replacement ribs are obtainable, having cap strips which are open at the top and are closed after being assembled on the spars with a special stamping bolted or riveted to the cap strip A light, rigid trailing edge section of stainless steel and hyb-lum, has been developed as well as a special hinge for those who require the primary and secondary aileron ribs to be hinged at the top of the rib A fairing section has been designed which offers great strength in bending at light weight and provides a flange at the bottom

The assembling jig is an example of the flexibility employed in the assembly of a structure This is set to exact contour and general dimensions The different units are held in place while the rib is being assembled and riveted and by resetting the clamps and spar fittings, one plate may be set for several different designed ribs The structure is next passed to the riveting machine which punches the hole and sets the rivet at the same operation Trussing is first notched on a machine incorporating as many individual punch presses as notches required in that section Presses are driven by one shaft and an application of the foot lever operates the entire gang Slitting is accomplished in a similar manner on the same type machine

TRADE CATALOGS

► *Airport and Aircraft Lighting Equipment* A 48-page catalog No 210-B of the above title was just issued by the Pyle-National Company The catalog contains descriptions of the company's full line of landing lights, navigation lights and special luminous-tipped switches for aircraft use The recently developed prismatic lens type built-in landing light is included A feature of special interest is a complete wiring diagram for airplane lighting installations The line of airport lighting equipment, fittings and special wiring appliances is also fully described

► *Manley Compressors* The latest Manley Co catalog contains the story of the newer line of compressors and the entire line of garage equipment. The booklet is completely illustrated

► *Pyrex Radio Insulators* The Corning Glass Works describes in a recent 19-page catalog the properties of Pyrex radio insulators and their use in Commander Byrd's Antarctic expedition. Various types of the insulators are illustrated including entering insulators for airplane use

WHAT OUR *Readers Say*

Non-Military Stunting

To the Editor

Many congratulations on your editorial in Aviation of Feb 1

Public Non-Military Stunting is one of the biggest menaces which the Aviation Industry has to face and no one who stays with aviation in this country alone can realize just how serious it is

Naturally most pilots like, through ego and through material considerations, to keep up the idea that a flier is a superman and stunting seems to be the favorite means to impress the public with his prowess (And just listen to them tell about their escapes from death!)

I have, as you know, spent much of my time in France and I have seen some of the pilots on the Airlines at le Bourget get frightfully "bawled out" for steep banks and glides because any sudden or exaggerated change in attitude produces fear and fear hurts the business of the line The pilots are there to guide their ships back and forth in a manner to attract traffic and not to impress the public with the terrible dangers of a pilot's life

Another thing which does about as much damage as the exaggerated newspaper stories of crashes are the current stories and movies of aviation where the pilot rescues the fair maiden amid the smoke of crash fires In fact many of my acquaintances link up any kind of a rough landing with fire

While I know how you feel about low landing speeds I think that we could well copy some of the specifications written into airplane purchase contracts when I first became connected with the business viz: 'The airplane shall land from an altitude of X feet with the engine shut down on a ploughed field and shall take off from the same terrain" While some of the safety skids, etc, which were attached to the old planes certainly did little to give aerodynamic efficiency they surely gave a lot of springy material to break up and absorb the force of a shock before anyone got badly hurt. For awhile at least we are going to have some pretty rotten pilots and bad places to get into when the engine suddenly stops and it is up to us to make it as nearly impossible for these men to kill themselves as we can

Because of his long ballooning experience my Grandfather (Prof T S C Lowe of Civil War fame) had little faith in airplanes but when I determined to enter the technical end of the industry such as it was in 1912 he advised me to learn to fly so I could see the problems of design from the operator's point of view, so I learned to fly a Burgess Wright and I think that the instruction of those days could also be copied

We were put on the leading edge of a wing with nothingness in front of us and taught to fly by feel, and not by sighting parts of the machine on the horizon so as to make it easy for us to stall the moment we did not have the horizon to sight on Another thing, the instructor bless his soul used to pull the compression cord so often and left us without power These things certainly gave us confidence before we were through

I cannot for the life of me see the necessity for excessive speed in small sport machines such as I have ridden here since my return (and which to quote our British cousins have "put the wind up"). The Klemms and Caudrons which I have run around in all over France glide with a feeling of solidity on the part of the air but most of the American machines in which I have ridden settle in an alarming manner when they should be GLIDING in This also frightens a beginner

Keep on hammering for safety and we will have once more the enthusiasm of 1928

Henry Lowe Brownback,
Norristown, Pa

[We cannot entirely sympathize with the writer's suggestion of the superiority of European aircraft and operating methods over American, but we heartily agree with him on the advisability of keeping wing loadings and landing speeds down It is, we believe, simply light loading that imparts that "feeling of solidity" of which Mr Brownback speaks so favorably.—Ed.]

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M. Henri Farman

To the Editor

I notice on page 466 of your March 1st issue mention of the memorial to M Henri Farman for the first recorded flight in history of one kilometer over a closed circuit

I think this should receive editorial comment, inasmuch as history records that in the year 1905 the Wright Brothers made 172 flights largely over a closed circuit

One of these flights was a distance of 23½ miles This was three years before the famous flight in 1908 made by M Henri Farman and commemorated as above stated I fail to see how this flight of Farman's represented any advance in the state of the art.

It is bad enough that the French should ignore the Wrights' records because they were not under the auspices of the F.A.I. but when they talk about history and when American newspapers and American audiences are taught to ignore the records of the Wrights, it is very regrettable and I call upon you as the oldest aviation magazine to make appropriate comment

Godfrey L Cabot
*(Past President,
National Aeronautic Assoc)*

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A Light Plane Need

To the Editor

In spite of your profuse apologies for giving so much space to any one ship I am certain that it will be many a year before Aviation publishes an issue half as interesting and important to the industry in general as your issue of February 8th, 1930, in which you describe the "Tanager"

One constantly reads visionary articles by optimistic sales managers explaining how to sell airplanes to a market that does not exist There is a real potential market for airplanes, but it is not made up of the wealthy who can afford five to ten thousand dollar planes but are afraid to fly, to the extent generally supposed On the contrary it is made up of hundreds like myself (old war-time flyers who have gone back to the ground again) together with those now being instructed and who can afford up to three or four thousand dollars for a ship they can trade in for a new one each year or so without sacrificing their present luxuries. However, most of us are not either ready or willing to commit suicide flying a lot of the present so called "sport pursuit planes" Many of these are excellent little ships but far too tricky for our meager flying ability For most of us a good safe job is out of reach. We therefore do the only sane sensible thing to do from a practical standpoint—continue to pay thirty dollars an hour occasionally for the privilege of flying a good safe ship Meanwhile the manufacturers of sport jobs starve to death or have receivers appointed trying to sell good high-priced, safe ships to non flyers and tricky reasonably-priced ships to dub" flyers like us

Could any aviation publication accomplish more for the good of the aviation industry than to induce some of the many manufacturers of light sport planes to sacrifice a little in speed and advertising claims for real honest safety of operation, thereby creating for itself a fertile market among those of us who earn our money

in our own businesses or professions and are ready and willing to contribute it (but not our lives!) to the "good of the cause" by flying for pleasure

William J Buckley,
Bridgeport, Conn

[While we dissociate ourselves from Mr Buckley's judgments upon the qualities of the typical airplane of moderate price as sold at the present time and especially from his comparison between the flying qualities of the low-priced and the high-priced machines and while we feel that his judgment in those matters has been considerably misled, he presents a very interesting point of view in behalf of a large group of purchasers who demand both a very exceptional degree of ease and safety of flying and a very considerable degree of economy, and who are completely unwilling to sacrifice either—Ed.]

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Flying Boat Facilities

To the Editor

There is a point to which your attention has certainly been called before, about which I would like to tell you my own experience

In my small flying boat, accompanied by an excellent pilot and mechanic, we left Washington on Friday Jan 10, at noon. After refueling at Hampton Roads, we landed in the evening at Morehead City and there our experiences began, we put the plane at anchor but a northeaster came during the night, the bay was full of white caps and in the morning I was well satisfied to find my machine still floating even with water rolling over the wings.

In Charleston, where fog and rain detained us for six days, the machine remained also anchored, getting more and more soaked every day During that stay I went to visit some points in central Georgia by train and we could not resume our trip before Friday Jan 17, to Jacksonville, where the fog was worse than ever Finally we landed in Miami the morning of Sunday Jan 19, happy to find at last the sun and the comfortable hangar of the Viking Flying Boat Co

Starting back Tuesday noon Jan 21, we arrived the 24th at Hampton Roads ice on the Potomac preventing us from taking the plane to Washington Poor weather also in the return trip, but that is not important

The point that I want to stress is the absolute lack of facilities along these over 1,000 mi of coast line from Norfolk to Miami To fly the 1,200 mi from Washington to Miami took us only 12 hr 15 min which could be done easily in two days with average weather and good accommodations

In Southport, for instance we lost almost one complete day while the gasoline was brought from Wilmington

The weather factor is less important in a seaplane when one can fly without danger over these long stretches of inland water much lower than on land If you see ahead one quarter of a mile you can always land safely in case of too dense a fog and throw out the anchor

It is necessary that at night you shelter the plane to grease the engine It is very hard to do it in the cold rain and wind in the darkness when everything is brought to you in a tilting row boat I wish all these row boats along the coast were not pierced with holes like regular sieves! You are obliged to count on the kindness of fishermen to help you to moor your craft for the night to look for lines etc

I must say that the help of all fishermen or others who were also most of the time shore bound by the fog never failed us, and I always felt embarrassed at their extreme willingness to help But that cannot replace the boon of a good service station

I ask your help in the name of all the tourists of the air (civilian or military) for fostering a campaign aimed at the creation of bases for seaplanes Much has been done for the land planes A parallel move for the seaplane should follow

Perhaps a tax on gasoline, though almost negligible in its yield at first, would help the project.

I enjoyed my trip immensely, though it could have been done more easily with two bases, for instance Southport and Jacksonville or Morehead City, Charleston St Augustine

It may be of interest that the average flying speed going down was 100 m.p.h and 80 m.p.h coming back, average 90 m.p.h miles

Installations like the one of the Viking Flying Boat Co are at Miami should be multiplied On Long Island Sound, Cape Cod, and the Coast of Maine there is plenty of room for them

[The writer is very well known to us as a conspicuous figure in the aeronautical world He requests that his name be withheld because of his official connections—Ed.]

Editorial Comment
FROM THE DAILY PRESS

The Aircraft Complication

After all, isn't the question of outlawry of submarines as engines of war in a fair way to become a matter of secondary consideration? If aircraft development continues at its present rate of speed, how long will it be before a country engaging in war will care very little about how many submersibles the foe possesses, or, indeed how many surface ships as long as it has a sufficient force of flying machines to insure supremacy above the water?

A person must be an emphatically cautious individual to doubt seriously the arrival of a time when such supremacy will place the dominating air power in a position to sweep the oceans clear of dreadnoughts, cruisers, destroyers and all sorts of vessels now making up navies and also purge the seas of submarines by the use of depth bombs, if it will be worth while to bother with such matters instead of making a direct attack upon the lands, cities and populations of the hostile country and wipe them out

Of course that time is not yet The naval conference is a fine thing It gets nations together It opens the way for the promotion of peaceful feeling and for general abandonment of excessive preparation against war But neither the London conference, nor any gathering which may follow it, will have the permanent result the world most needs, lacking the inauguration of an effective program for the restriction of aerial war strength, an exceedingly difficult thing to accomplish; almost as difficult to imagine as it would have been to restrict the naval strength of nations by agreement in the days when a fairly effective fighting vessel could be manufactured out of a merchantman by putting cannon on her main deck and stocking her with powder and balls.

—Detroit Free Press.

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Metropolitan Movies

"Oh, yes, I'm sure the engine and all that sort of thing is all right; what I'm interested in is the upholstery."—Wortman in the New York World

New Volumes

FOR THE SHELVES

A Biography of the Wrights

THE WRIGHT BROTHERS, FATHERS OF FLIGHT, *by John R MacMahon, Little, Brown & Co , 308 pp , $2.50*

MR LYTTON STRACHEY has remarked that the first requisite of a historian is ignorance which automatically selects and leaves out the unimportant, the unessential the irrelevant. In that sentence he hit upon the capital difficulty of biography when practiced upon bioplasm. A biographer with a living subject must either view him at a distance and commit errors of fact or view him close at hand and commit errors of judgment In writing "The Wright Brothers; Fathers of Flight," John R McMahon has chosen the second course.

Mr McMahon has written his book in a supple, sinewy style He has an active sense of drama and he nicely avoids a dusty and matter-of-fact air on the one hand or an overgaudy journalism on the other If he commits an occasional cliche or writes a dialect sentence 'vraiment, zat is a fair gamble!" Let it be admitted that these represent not so much blemishes as freckles upon the fair face of his style. And if he is a little too facile in conjuring up imaginary conversations and mind-readings of the brothers in the fashion made popular by Emil Ludwig, then that, after all, is only because Mr McMahon's own conversational gifts far outrun those of his abnormally shy and taciturn subjects—perhaps the two most difficult men of fame from whom a hunter for the interesting and bizarre ever tried to express the warm juices of humanity

I wish it were possible to avoid saying that Mr McMahon's book has one fatal, ingrained blemish The downright errors of fact are few But the errors of perspective are so great that Mr McMahon's book is, from his very zeal, inevitably debarred from taking the position it ought to have on the shelves of serious history Like O'Henry's master brew which failed because it lacked only one little clarifying dash of mineral water, Mr McMahon's book is disappointing because in all of its three hundred and eight pages you will not find the faintest suspicion of the objective attitude

Therein lies the danger of too close a view of one's subject No men ever more richly deserved success than the Wright brothers But why should Mr McMahon, their biographer, in upholding their position find it necessary either to minimize or actually to derogate the work of almost every other aeronaut, successful or unsuccessful, since the history of flight began? I am not aware that in the year 1930 it is any longer necessary to labor so hard at the proof that the Wright brothers were inevitably the first successful pioneers in developing free, sustained, man-carrying, power-driven flight. This distinction is now, beyond all contention, a matter of universal acceptance. Mr. McMahon doth protest too much

By way of completing his thesis, Mr McMahon has seen fit to be scornful of Sir George Cayley, William Henson, John Stringfellow, Alphonse Pénaud, Sir Hiram Maxim, Samuel Langley, Alberto Santos-Dumont, Octave Chanute, Louis Blériot and almost everyone else in the catalogues of aeronautical history Is it, then, of no importance that Sir George Cayley was the first designer of the biplane which the Wright brothers utilized? Or that Alphonse Pénaud suggested the interconnection of horizontal and vertical rudders control and an aileron arrangement which the Wright brothers were the first to originate in full scale and operate successfully? Or that Octave Chanute (whom Mr. McMahon subjects to an almost continuous drubbing) was the first man to make the biplane so structurally sound that it would avoid the ills of its predecessors in coming apart in the air—always a discommoding aerial occurrence?

None of these facts, to the slightest degree, detract from the credit and glory that belongs to the Wrights. Mr McMahon, who had access to the Wright diaries, and whose work will therefore be considered an important one in the future has done himself, the Wright brothers, and history a considerable disservice which he could have avoided by the simple device of being less insistent that almost all valuable aeronautical experience rose with the Wrights in 1900 and sank again when they ceased activity.

The Wrights owe no debt whatever to any of the work of Langley, Curtiss, Santos-Dumont or Blériot any more than they do to Maxim, Henson, or Stringfellow. Yet it is certainly a falsification of history so to belittle the work of these men, that the reader is never likely to know how valuable, even if not always successful, their experiments were. Henson was the first man whose mind imagined the monoplane; Stringfellow, the first man to fly a model from a continuous source of power; Maxim the first man to attempt really scientific aero-dynamic data gathering (with the exception of Lilienthal, to whom Mr. McMahon does give generous credit). Langley obtained model flights of remarkable sustension and excellent automatic stabilization, he missed full-scale success by the narrowest of margins and his data, although inaccurate, were honest and conceived on a good scientific plan.

Should Santos-Dumont receive no credit for making the first public heavier-than-air flight in history and likewise the first voluntary take off obtained solely under engine power without the aid of launching gear? Is it nothing that Blériot rose triumphantly from the wrecks of fifty crashes and successfully completed the first sustained flight over water? Is likewise nothing due him for having flown the first practicable and successful monoplane—the design that is now fast superseding the biplane for all work of heavy carriage? It seems scarcely likely that history will sustain Mr. McMahon's attitude

The legalistic merit of the Wright-Curtiss suits was unquestionably with the Wrights, yet equally unquestionably Curtiss' substitution of his aileron for the now vanished warping wing of the Wrights' was, even though a technical infringement, an advance in the state of the art for which Mr. Curtiss should have the fullest credit. It is curious that what historians refuse, bankers accomplish. No better testimony to the futility of raking up the cold ashes of this dead controversy could be had than that the Curtiss and Wright Companies are now joined together.

The Wright brothers, unquestionable originators were not in reality fighting individuals like Curtiss and Paulhan. They were fighting the ambitions of all mankind; fighting the inevitable tendency of art to rise above the artist and science to transcend all scientists. Every innovator has found himself in the same unhappy personal situation. The personal position of the Wright brothers was unhappy but historically altogether inevitable and Mr. McMahon advances nothing by his special pleading.

Mr. McMahon has done a historical service in exploding some misconceptions which many predecessors (including the writer of this review!) have perpetuated. But I must take specific exception to his statements that Langley's law was "an aerial application of the something-for-nothing notion", that the Wrights were the originators of the wind-tunnel; that Chanute's "own gliders had failed utterly in the hands of his employee, Herring", that the Wright brothers used no launching weight at Kitty Hawk. Accurate sources to varying degrees specifically contradict each such statement and I have no doubt that the memory of Mr. Orville Wright can do the same.

It is most unfortunate that in this late year an air of bad temper should still cling to an account of the early days of flight Many earlier judgments were unquestionably unjust, the earlier attitude of the Smithsonian Institution is indefensible But it must always be remembered that the Wrights experimented for five years in deep secret They mistrusted the world and the world reacted unjustly but understandably by mistrusting them A quotation from Leon Bolle which Mr. McMahon gives to pages 211-212, is a perfect characterizer of the brothers

"Mr [Wilbur] Wright makes the mistake of wishing to do everything to himself and will not listen to any suggestion which would save his endless trouble and make his flights easier He has no ball-bearings on his propeller shafts I pointed out to him that if he used these instead of the old fashioned bearings, that require an excessive amount of oiling, he would run less risk of over-heating, but he would have none of them Do you know why? Simply because he was unable to make them himself! He will not allow anybody to touch his machine or handle so much as a piece of wire, he even refuses to allow his mechanic to pour oil into his reservoir In his opinion they don't do it in a correct way"

Readable, and interesting as Mr McMahon's book is, history's shelves stand in as great a need of an accurate and impartial biography of the Wright brothers as they did before he wrote it —ERIC F HODGINS

Abstracts AND *Reviews*

Beginner's Manual

ELEMENTARY LABORATORY AERODYNAMICS, *by Arthur L. Jordan The Ronald Press, New York, 1929 $ 80*

A NEW laboratory manual which is practical for use in high schools where a class has been started in aerodynamics has just been offered to educators The booklet is, as its name implies, very elementary and develops the subject from the first fundamentals The first experiment deals with the reaction of various shaped surfaces to a current of air flowing over them The surfaces are placed at several angles and the drag and "kite" effects are noted From this, the experiments go to more complicated tests and a few structural analyses

The booklet contains twenty-one experiments and is designed to accompany a course of three recitation and four laboratory periods per week. It assumes a knowledge on the part of the pupil of elementary algebra and trigonometry

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Large Airfoil Tests

TESTS OF LARGE AIRFOILS IN THE PROPELLER RESEARCH TUNNEL, INCLUDING TWO WITH CORRUGATED SURFACES, *By Donald H Wood N.A.C.A. Technical Report No 336*

TESTS were recently conducted by National Advisory Committee for Aeronautics to determine the effect of corrugated surfaces upon the characteristics of a wing

The airfoil selected was a Clark Y one wing having the Clark Y section at the top of the corrugations and the other the same section under the metal covering

Tests were also made of the Gottingen 398 N.A.C.A. M-6, and N.A.C.A. 84 airfoils

The models tested were of 2-ft. chord and 12-ft. span and the wind tunnel used was the Propeller Research Tunnel with 20-ft. diameter throat The speeds were approximately 80 and 100 m.p.h. giving Reynolds Numbers of 1,575,000 and 1,940,000, respectively

Readings were taken of lift and drag at angles of attack varying from —9 deg to +35 deg The results are presented in the form of tables and curves of C_L, C_D, C_M, and C_p. Additional curves are given to facilitate correction for aspect ratios and the choice of airfoils for a particular purpose

The corrugated Clark Y wing showed a marked flattening of the lift curve at the burble point and a lower negative slope beyond the burble Throughout the normal flying range the slope of the lift curve was unaffected At any given angle of attack the corrugated surface airfoil showed a slightly higher lift with considerably greater drag so that the Lift/Drag ratio is inferior to that of a smooth airfoil, though only slightly so at 6 deg and above

The effect of minor variations in the surface of the wing, such as the difference between a varnished and unvarnished surface was negligible.

These tests at high Reynolds numbers showed a marked flattening of the lift curves at the burble point as compared with the sudden break frequently found in low scale tests

New Patents

System of Airport Runways

1,747,583. SYSTEM OF RUNWAYS GAVIN HADDEN New York and CHARLES A. HOLDEN New Rochelle N Y said Holden assignor to said Hadden Filed Nov 7, 1928 Serial No 317,794 5 Claims (Cl. 244—2)

IN ORDER to economize on the cost of construction of several runways running in various directions at an airport the runways are laid out so that they will overlap to the greatest possible extent By this arrangement each runway will serve also as portions of the other runways It is stated that the maximum amount of overlapping is obtained when the runways extend inwardly from the corners of an equilateral triangle and separated from each other by equal angles

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Adjustable Airplane Wing

1,747,637 ADJUSTABLE AEROPLANE WING ALF N LARSEN Ogden Utah. Filed Oct. 31 1929 Serial No 403,868 9 Claims (Cl. 244—12)

THE PURPOSE of this device is to permit the thickness of the wing to be varied to vary the speed and lifting factors For this purpose the wing structure includes upper and lower bars running from front to rear and pivotally connected at their front ends to a pair of pivoted links so that they may be spread apart to the desired degree A lazy-tongs operates between the bars, and a gear connection from the tongs to the pilot is designed to place under the pilot's control the opening and closing of the tongs with the corresponding spreading and drawing together of the upper and lower bars

The covering of the wing is flexible material intended to stretch and contract as the bars are spread and drawn together

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Airplane Landing Floor

1,747,582 AIRPLANE LANDING FLOOR. GAVIN HADDEN New York and CHARLES A HOLDEN New Rochelle N Y said Holden assignor to said Hadden Filed Nov 7, 1928 Serial No 317,793 2 Claims. (Cl 244—2.)

WHERE IT IS NECESSARY to provide a landing floor which shall give the maximum runway in the least area, it is stated that this can be accomplished by laying out a field having three sides each side being an arc of a circle having its center at the intersection of the other two sides

SIDE SLIPS

By
Robert R. Osborn

We have long realized that one of the serious shortcomings of this column was that we didn't have enough poetry in it and yet we have never been able to fill this need ourself being about as poetical as a Model T Ford. Also we have hesitated to broadcast an appeal for poetical contributions as the majority of people have no more ability along this line than we have, but don't know it. Now, after all these years "Acou" sends in a beautiful lyric leaving the titling of his masterpiece to us. We shall call it

Them Aint Pants, Stranger

In the airman's profound nomenclature,
All the doo-dads and gadgets have names,
"Pants" is the term they have doped out
For the hoods o'er the wheels of the planes.

But consider the Keystone Patrician
Surely here's where our namer went bats,
I say, you can't call those things trousers,
They're really two backward-aimed spats.

To be accurate in the matter, the only other poetry which has appeared in this space, was written about two years ago by Mr. E.T.C. and it was really so beautiful that it is worth repeating:

The Spirit of Aviation

Our Henry took his chaser plane,
A'flying in a storm of rain;
But engine trouble did develop
And now he needs a little hellop.

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Apparently to Be Used on the Flights Cancelled on Account of Bad Weather

"The Christian Science Publishing Society last week bought its second O-trip commutation ticket on the Colonial Boston-New York service." Item discovered in the Boston *Herald* by P.L.L.

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This Week's Astounding Aeronautical Event

"The most unusual feature about the weight of the LB 20 is the fact that the plane is able to carry practically its own weight when in flight."

Found in some advertising literature from the New York Show by E. R. C. of Larchmont, N. Y.

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The eagle eye of Mr. DeW. V. B. T., of Morristown, N. J., spotted the following item in the esteemed New York *Times*: "A million *rules* of flying is scheduled for Army aviators going to and returning from the Air Corps maneuvers to be held in April at Mather Field, Sacramento, Calif., the War Department stated today."

The Intrepid Aviator happened to be picking up a few cigars from our desk and saw this clipping thereon. He said that a million rules were really an amount to contend with, and the Department of Commerce inspectors had quoted nearly that many to prove to him that his Jenny should be grounded permanently.

• • •

We have just been reading the recommendations of a U. S. Navy flight surgeon to pilots who wish to indulge in high speed flying. In diving and making high speed turns he suggests that the pilot should let out a series of high pitched yells and shrieks to aid in preventing himself from "going black." We should like to call attention to the fact that this is an old idea. Flying instructors have been letting out a series of yells and shrieks for years — with the intention of causing the student to "go black."

• • •

Of course we have always been advocating honesty in aeronautical advertising but we do believe that it is possible to carry honesty to the point where it becomes a fault. For instance, consider the case sent in by L. J. M., —a clipping from the advertising of one manufacturer, containing a statement: "In this new home a series of . . . airplanes is starting down the long assembly lines, *parts are coming off the brand new machines* and soon planes will begin to appear on the airport at the rear of the plant and take to their wings."

In the days of frenzied production a year or so ago, sometimes it was difficult to get a ship out the back door of the plant before a couple of exhaust manifolds had fallen off, but even then no manufacturers took the trouble to advertise the fact.

• • •

Mr. C. F. McR. of Los Angeles, who has lately risen as the defender of the west against our attacks, sends in a newspaper clipping which has as its heading "19 Army Planes Fitted with Skis on 3,700 Mile Hop." He wants to know if fitting a nineteen ship formation with skis while on a hop somewhere, isn't more of a stunt than has caused the bad reputation of the California flyers,—as they simply repair landing gears and overhaul motors in flight.

We must admit that C. F. McR.'s charge has a good basis—in fact if there's just one more news item like this about the Army we're going to write to our senator about them. But it wasn't these latter activities which first turned us against the California flyers,—it was the number of electric stoves which they were carrying in airplanes for the first time in history, which aroused our editorial ire.

• • •

And if C. F. McR. wants additional proof that we have a right to wonder just what is going on in California in an aeronautical way, let him explain the heading in the Los Angeles Times of January 12th—"Outdoor Flying Taught."

Are YOU Protected Against This Terrible Fire Danger?

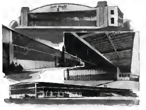
KILL a fire during the first ten minutes, and the damage will be a trifling. Let it get out of control, and the loss may be staggering. And no insurance will pay for the setback to business, even more serious than material loss. The only positive protection against this fire danger is local fire fighting equipment, placed for instant use.

BADGER'S Non-Freeze 40 Gallon Fire Engine

gives positive protection, winter and summer. Temperatures of 40° below zero and lower, can't freeze or clog it. Banishes the extra hazard of winter fires, and may avert disaster when ordinary fire fighting equipment is useless because of the cold. You should have this all weather fire protection for your airport, hangar or plant. It must be BADGER, for only BADGER builds a 40-gallon, non-freeze engine that has been tested and recommended for use by the Underwriters' Laboratories and Factory Mutuals. Write for complete details and prices—TODAY!

BADGER PRODUCTS include a complete line of hand operated fire fighting equipment in Non-Freeze, Foam, Soda-Acid, and Carbon Tetrachloride types.

BADGER FIRE EXTINGUISHER CO.
962 PARK SQUARE BUILDING, BOSTON, MASS.



Curtiss Flying Service Hangar, Glenview, Ill.
Robert Wentworth, Dewey & McCormick, Inc., Architects
Truscon products used throughout

Attractive—Fireproof—Daylighted—Efficient

The specialized requirements of aeronautical buildings are fully met by standardized Truscon Steel Products at economical cost.

In the Curtiss Flying Service Hangar, shown above, Truscon Steel Doors are used throughout, including the large Steel Hangar Doors, both Straight Slide and Curved Track types.

The fireproof roof consists of Truscon Steeldecks, insulated and waterproofed. The floors and roofs are supported on Truscon Steel Joists, "O-T" Open Truss and "P-G" Plate Girder types. The concrete is reinforced with Truscon Welded Steel Fabric and Bars.

Whether interested in individual building products or in complete standardized buildings, write for suggestions, quotations and catalogs.

TRUSCON STEEL COMPANY
YOUNGSTOWN, OHIO
Warehouses and Offices in Principal Cities
Truscon Steel Company of Canada, Limited, Walkerville, Ontario

Build NOW While COSTS Are Low

TRUSCON
STEEL BUILDING PRODUCTS
FOR AIRPLANE HANGARS AND AIRPORTS

Material	Specific Gravity	Young's Modulus of Elasticity lbs per sq in	Ultimate Tensile strength lbs per sq in	Yield Point lbs per sq in	Fatigue Limit lbs. per sq in	Specific Tensile Strength*	Specific Yield Point*	Specific Fatigue Limit*
Alcoa Aluminum 17ST	2.8	10,000,000	58,000	35,000	15,000	20,710	12,500	5,360
Chrome-molybdenum steel	7.9	30,000,000	100,000	60,000	40,000	12,650	7,600	5,060

Technical Data Which Gives Definite Proof that Alcoa Aluminum is the One Metal that Flies Best

*The specific tensile strength, specific yield point, and specific fatigue limit are equal to ultimate tensile strength, yield point and fatigue limit divided by the specific gravity.

Replacing other metals, Alcoa Aluminum offers either of these two advantages...

1. Equal strength with less weight
2. Equal weight with greater strength

ALCOA ALUMINUM

Because metal will not shatter, is non-combustible, has greater strength and can be fabricated exactly and duplicated in manifold shapes, it is more and more replacing wood for plane construction.

Among the metals considered by the airplane designer and builder, one stands out. In the past few years the use of the light, strong Alloys of Alcoa Aluminum has increased tremendously, both as to the amount used in a single plane and the number of companies employing them.

These alloys have the combination of advantages so long sought for planes—both light weight and great strength. When a metal part is built to a *specified strength* it can be made *lighter* with Alcoa Aluminum. When a part is to be built to a specified *weight* it can be made *stronger* with Alcoa Aluminum. The chart above gives technical data on this point.

The fabricating technique for Alcoa Aluminum is no more difficult than that for steel. The machinery required for either is much the same. Our nearest office will gladly supply you with full information on the application and fabrication of Alcoa Aluminum and its alloys for any definite purpose you may have in mind. ALUMINUM COMPANY *of* AMERICA, 2482 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA

ALCOA ALUMINUM

This is one of a series of advertisements directed originally to advertising men in an effort to make industrial advertising more profitable to buyer and seller. It is printed in these pages as an indication to readers that McGraw-Hill publishing standards mean advertising effectiveness as well as editorial virility.

Every day is moving day in industry

JUST suppose we sold you the McGraw-Hill list of 600,000 paid subscribers. We wouldn't — but just suppose we did. A year from today it would be a source of complaint to you unless you also had:

a...Our circulation staff of 100 field men who will travel nearly a million miles during 1929, checking, checking, checking.

b...The good will of thousands of subscribers who voluntarily inform us of their changing responsibilities and addresses month after month.

c...The Second Class postal privileges that automatically correct addresses when addressees do not.

What is a perfectly good industrial list today will be at least 25% defective a year from today. For example: We have checked the 1928 records of 13 of the 26 McGraw-Hill publications which have a circulation of 210,176 paid subscribers.

Were it not for these channels of checking, this list of 210,176 names would have contained on December 31, 1928, deadwood to the extent of 48,120 names. Not on account of failure to renew nor delay in remitting, but because of changing functions and addresses brought about by:

Plant expansion	*Mergers*
New projects	*Advancement*
Decentralization	*Centralization*
Out of business	*Transfer*

Out-and-out job changing
Change of residence

McGRAW-HILL PUBLICATIONS

New York Chicago Cleveland Detroit Philadelphia St Louis
Greenville San Francisco Boston London

V 14

Where the factor of safety is all important . . . .

Through Death Valley, across the Bad Lands, the Rockies, or scorching desert sands, the reliability of Zapon products continues supreme. Since the beginning of aviation they have contributed largely as an all important factor of safety. In

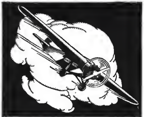
Clear Nitrate Aeroplane Dopes
Semi Pigmented Aeroplane Dopes
Gloss Pigmented Aeroplane Dopes

the element of safety is constantly assured by the most exacting series of continuous laboratory tests, each step vitally essential to maintaining not only the highest standard of Zapon quality but also absolute safety in the air.

Also Thinners, Lacquer Enamels
and Lacquer Primers

It is the age of color even for the plane and in keeping with this modern desire, Zapon Cloth for interior upholstery lends an ultra luxurious finish to the finest sport job. Brilliant in color, attractive in pattern, its durability is such as to "wear and wear and wear."

THE ZAPON COMPANY
STAMFORD, CONN.



Our wide experience

in the field of

AUTOMOTIVE ENGINES

makes us a most practical source for

AIRPLANE SPRINGS

on a production or experimental basis

Two Plants for Spring Service

COOK SPRING CO. DIVISION
OF BARNES-GIBSON-RAYMOND INC
ANN ARBOR, MICHIGAN
DETROIT DIVISION — 6400 MILLER AVE. DETROIT

EVERY airport owner or manager should have a copy of our new booklet, *Tycos Meteorological Instruments for Airports.* Illustrated throughout and listing instruments which meet government requirements Write for your copy today.

Taylor Instrument Companies
ROCHESTER N Y U S A
Canadian Plant Tycos Building Toronto

United Airport of Boeing System at Los Angeles. Layout, design and construction by Austin.

Airport Engineering Experience

COMPLETE airports, hangars, aircraft factories, of Austin design and construction, from Coast to Coast, testify to the seasoned experience of Austin Airport Engineers.

For information on any type or size of project, phone the nearest office, wire or write

THE AUSTIN COMPANY
Airport Engineers and Builders CLEVELAND
New York Chicago, Philadelphia, Detroit Cincinnati, Pittsburgh St Louis, Seattle, Portland, Phoenix The Austin Company of California Los Angeles, Oakland and San Francisco The Austin Company of Texas Dallas The Austin Company of Canada Limited

AUSTIN METHOD

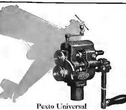
Union Special stitching *means* unsurpassed security

UNION Special sewing machines produce the double locked stitch seam, U. S. Government standard stitch type 401, which is recognized as unsurpassed in security for all classes of aircraft fabric sewing operations.

With the double locked stitch, every loop of the upper thread is twice locked with lower, which prevents the seam giving way even if the thread is broken The double stitch felled seam possesses great strength, durability and elasticity superior to the fabric itself

Union Special sewing machines are famous for their perfect quality of work and high speed operation Our engineers offer a valuable service to manufacturers who wish to obtain high grade sewing under economical production conditions.

Union Special Machine Co.
400 N. Franklin St
Chicago, Ill



Pexto Universal Rotary Machines

Pexto Universal Rotary Machines for wiring, turning and burring operations are inexpensive and largely employed by the All Metal Aircraft Builder

Write for catalogue 25A Machines and Tools for Sheet Metal Work

PEXTO

The Peck, Stow & Wilcox Co.
Southington Conn. U S A

for dimensional accuracy and long life specify RAYMOND SPRINGS

The fact that Raymond Valve Springs were used in the Curtiss Challenger Motor in the Monoplane "St Louis Robin" which shattered all existing endurance flight records, is sufficient proof of our ability to meet your spring requirements.

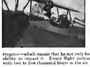
Send us your inquiries for coil springs, flat springs, wire forms, and small stampings. . . . .

Makers of Quality Springs since 1883

RAYMOND MANUFACTURING CO.
CORRY. PENNSYLVANIA

Young Men
your future depends upon your training

You who receive instruction now will be the ones piloting ships building repairing and testing them a few months hence—providing you receive the proper training The School of Von Hoffmann will give you this training Vision and foresight has kept Von Hoffmann a slightly ahead of the rest—a great school with a single purpose—to make each graduate the finest type of pilot or mechanic



Instruction is given on a variety of late types of Government Licensed modern aircraft open and cabin types Each instructor has been rigidly examined and licensed by the Department of Commerce as an instructor—which means that he not only has the knowledge but the ability to impart it Every flight instructor is a transport pilot with two to five thousand hours in the air

Graduates of the School of Von Hoffmann succeed in aviation because the courses go beyond the Government requirements and employers know that they have been thoroughly and practically trained for immediate positions. That is the reason Von Hoffmann graduates are filling responsible positions throughout the industry Our courses cover actual flying theoretical instructions aero navigation, airplane instruments and practical shop training in airplane structure and repair of various type planes A Government rated school located on a $2 000 000 airport No other school in the world can offer you the advantages of Von Hoffmann training Let us tell you about our liberal time payment plan Send today for our new illustrated catalog. Make your start in aviation—mail the coupon NOW!

Von Hoffmann Aircraft School
Lambert St. Louis Airport—St. Louis, Missouri

U. S. Gov't Approved School for Transport, Limited Commercial Private Pilot, Ground and Flying

VON HOFFMANN AIRCRAFT SCHOOL
1798 Lambert-St. Louis Flying Field, St Louis Mo—MAIL TODAY.

Name

Address

City State

Age I am interested in

☐ Flying Course ☐ Mechanics Course
☐ Welding Course ☐ Home Study

PERRY-AUSTEN DOPES

Don't Crack
Don't Peel
Don't Rot

Good Take Up
Good Fill
Easy to Apply

These essential qualities of good dopes are demanded by experienced aircraft manufacturers. That they are inherent in PERRY-AUSTEN DOPES has been proved by Government and manufacturers' laboratory tests and in practical service on thousands of military and commercial aircraft.

PERRY-AUSTEN DOPES are produced by the oldest manufacturer of aircraft dopes in the United States and they are used by many of America's foremost aircraft manufacturers. Ask for our quotations, whether for large or small quantities.

Contractors to United States Government

PERRY-AUSTEN MFG. CO.
Main Office and Works: Grasmere, Staten Island, N. Y.
Tel. Dongan Hills 707
Chicago: 510 N. Dearborn St. Tel. Superior 6948

PIONEERS

First in the field as Aeronautical Parts and Supplies Dealers, Nicholas-Beazley has built an enviable reputation by giving complete customer satisfaction.

Nicholas-Beazley Airplane Company Inc.
Marshall - - Missouri

Western Branch—3700 Moneta Avenue, Los Angeles, Calif.

SER-O-PLY AIRCRAFT PLYWOOD

The Original Blood Albumen Glue Plywood manufactured in strict accordance with A. and N. Specifications

Advantageously Used in

AIRCRAFT—CANOES—
BOATS—GLIDERS

THE CARROM COMPANY
Since 1889 LUDINGTON, MICHIGAN

SEAPLANE FLOATS

FLYING BOAT HULLS

SEYMOUR J. BAUM, Inc.
268-298 Albion Street Elmhurst L. I.

AEROL

Shock Absorbing Landing Struts

No other part of an airplane is built with more care, precision and finer materials than are Aerol Landing Struts. Built by The Cleveland Pneumatic Tool Company, Cleveland, Ohio. ¶ The Company also offers a complete line of fine air-operated hammers, drills and accessories.

AEROL shock absorbing STRUT

WANTED DEALERS

The 1930 sales policy of the OLDEST propeller manufacturer in America enables all operating sales organizations flying schools and allied aircraft manufacturers to purchase "SUPREME" propellers at uniform discounts, direct from the factory.

SUPREME PROPELLER COMPANY WICHITA, KANS. U.S.A.

Dealers are needed to handle the new business created by such a policy. Act as the SUPREME Dealer in your territory. Profit by the performance and sales of SUPREME.

Write or wire for details and discounts.

Supreme Propeller Co.
WICHITA, KANSAS
Manufacturers since 1908

Brass *and* Copper

CHASE CHASE

Immediate delivery from
18 convenient warehouses

CHASE BRASS & COPPER CO.—Incorporated—
Waterbury, Conn.

WHERE TO FLY

CALIFORNIA

AIRTECH SCHOOL OF AVIATION
LINDBERGH FIELD, SAN DIEGO, CALIFORNIA
Send for Complete Information
Department of Commerce Approved Transport Ground & Flying School

NEBRASKA

Learn AVIATION WHERE LINDBERGH STARTED!

GET TRAINING THAT ASSURES SUCCESS!

Come to Lincoln—one of the largest, best-known and finest-equipped civilian air schools in the U. S. We trained Lindbergh. Your FREE Literature tells the story! Prepare you for a pilot commercial or transport license. Complete practical courses in airplane building and mechanics. Instructors and training planes carry U. S. Dept. of Commerce licenses. Write for FREE Literature today.

LINCOLN AIRPLANE SCHOOL
741 Aircraft Bldg. Lincoln, Nebr.

NEW YORK STATE

FLY

FOR SPORT OR PROFIT

Complete ground and flying courses by competent instructors. Dual 10 hrs. $200 — 20 hrs. private $350 — 50 hrs. L.C. $850. — Solo at $18 per hr.
Distributors Monocoupe, Monosport, Monocoach. Ford Tri Motor charter trips at low cost.

MOHAWK AIRWAYS
Operators
ALBANY AIRPORT
ALBANY, N. Y.

FLORIDA

HOCH FLYING SCHOOLS

Latest type training planes used. Instructors Licensed by Dept. of Commerce. Courses financed. Write for details.
Latest Methods of Instruction
Northern Division: BUTLER, PA.
Southern Division: FLAGLER BEACH, FLA.

NEW JERSEY

GET A FLYING START AT
AIRVIEW FLYING SERVICE, Inc.

Learn to fly at finest Airport on Jersey Coast

Distributors for Waco, Aeromarine-Klemm
Agents for Fairchild, Curtiss Products

Taxi Service — Photography — Service and Repairs — Hangar Space — 1 hour from New York City

Write for details

Phone Red Bank 1780
Red Bank, N. J.

NEW YORK CITY

LEARN to FLY with CURTISS WRIGHT

Get into Aviation—the big, new romantic industry. Learn to fly the Curtiss Wright way at one of the 40 schools. Write for free booklet.

CURTISS WRIGHT FLYING SERVICE
"World's Oldest Flying Organization"
Dept. AV, 27 W 57th St., New York City

ILLINOIS

Eagle Airways, Hinckley, Illinois, formerly Eagle Airport School of Aviation, 50 miles West of Chicago. Learn to fly at our new location on the Transcontinental Airway, DeKalb County Airport equipped for night flying. Transport Pilots, modern equipment, reasonable rates, excellent accommodations. Distributors for Mohawk Monoplanes, Air-Kings and Monocoupes. Write for free information.

EAGLE AIRWAYS, INC.
Hinckley, Illinois

MICHIGAN

Skyways are Easy Highways—Our Way!
Flying, Business and Mechanical Courses thoroughly taught by the

BATTLE CREEK FLYING SCHOOL, INC.
Battle Creek, Michigan

Personnel and Equipment in accordance with Department of Commerce Regulations. Write for particulars on our payment plan.

NEW YORK STATE

THE PERFECT TAKE-OFF FOR YOUR FLYING CAREER...

ROOSEVELT AVIATION SCHOOL

After the Army pattern—equipment, curriculum, Army trained instructors. At Roosevelt Field, where Lindbergh, Chamberlin and Byrd hopped from. 45 minutes from Broadway. Dormitory for resident students, and swimming pool now in progress. Write N. J. Boots, Lt. Col., Roosevelt Aviation School, Inc., Mineola, L. I., N. Y.

OKLAHOMA

U. S. DEP'T OF COMMERCE APPROVED TRANSPORT GROUND & FLYING SCHOOL

CATALOGUE ON REQUEST

SPARTAN SCHOOL OF AERONAUTICS
TULSA OKLA.

MISSOURI

UNIVERSAL AVIATION SCHOOLS

A National System of Government Approved Aviation Schools

Universal Flying School	Cleveland, Ohio
Universal Flying School	Memphis, Tenn.
Universal Flying School	Minneapolis, Minn.
Universal Flying School	St. Louis, Mo.
Universal Flying School	St. Paul, Minn.
Universal Flying School	Kansas City, Kansas

UNIVERSAL AVIATION SCHOOLS
Headquarters
1601-1619 Boatmen's Bank Bldg. St. Louis, Mo.

You Fly Daily at Our Own Huge Airport

Ground and Flight Instruction on New, Modern Equipment.

Open and Closed Ships

Hayes Flying School

FLYING COURSES
$245, $395, $995

Write for Information

230 W. Genesee St., Syracuse, N. Y.

PENNSYLVANIA

Distributors: Curtiss Wright Moth, Robin, Travel-Air, Keystone-Loening

LUDINGTON

Complete Flying Courses complying with latest regulations of the Department of Commerce. Adequately equip you for private or commercial license. Expert licensed instructors. Write, phone or wire for details.

LEARN TO FLY

LUDINGTON PHILADELPHIA FLYING SERVICE, INC.
Operators of the Philadelphia Airport
City Office, 848 Atlantic Building, Philadelphia, Pa.

NEW HAMPSHIRE

LEARN TO FLY AT THE
FOGG FLYING SCHOOL
Concord Airport, New Hampshire

Courses for all classes of licenses given in new planes under instructors with over 4,000 hours each to their credit.

NEWHAMCO AIR SERVICE
Concord, New Hampshire

For advertising rates in the "Where To Fly" Section of *Aviation* write to

Searchlight Dept.
Tenth Ave. at 36th St. New York City

FLY NOW

AVIATION TRAINING

U. S. GOV. APPROVED SCHOOL

AGENTS FOR: Waco, Stinson, Loening, Fleet, Travelair

D. W. FLYING SERVICE
LE ROY, N. Y.

PITCAIRN AVIATION of Pennsylvania, Inc.

10-, 20- and 50-Hour Flying Courses leading to Federal licenses conducted at Pitcairn Field, Willow Grove, Pa., one of the largest in the East, in midst of ideal flying country. All year round school. Modern flying equipment. No liability bond required. Write for Illustrated Booklet.

Pitcairn Field, Willow Grove, Pa.

AIRCRAFT SERVICE DIRECTORY

Professional Services

For Advertising Rates in the "Professional Service Directory" of Aviation Write to

Professional Directory Division
Tenth Ave. at 36th St. New York City

SEARCHLIGHT SECTION

EMPLOYMENT and BUSINESS OPPORTUNITIES—USED and SURPLUS NEW EQUIPMENT

UNDISPLAYED—RATE PER WORD

Positions Wanted, Positions Vacant and all other classifications excepting equipment 10 cents a word, minimum $2.50 an insertion. 15 cents a word if a box number address care of any of our offices is used.

Proposals 45 cents a line an insertion.

INFORMATION

Box Numbers may be in care of our New York, Chicago or San Francisco offices.

Discount of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH

1 to 3 inches	$6.00 an inch
4 to 7 inches	5.75 an inch
8 to 14 inches	5.50 an inch

Other spaces and contract rates on request.
An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

FOR SALE

BOOSTER magnetos—Brand new Robert Bosch Booster magneto only $12.50 each. U. S. Magneto Company, 808 Washington Blvd., Chicago Ill.

CASH needed brand new Arrow Sport Leblond 60, in perfect condition never been used $2,300 for quick sale. Telephone Hugh Rockwell, Freeport N. Y. 4863.

CURTISS Challenger Robin. Ship always in hangar, less than 50 hours, purchased 1st September. Can deliver Chicago, St. Louis or Kansas City. Equipment includes bank turn navigation and landing lights, Willard aircraft battery. Prefer cash but might consider Gypsy Moth. C. E. Carroll, Phoenix Bldg. Minneapolis, Minn.

FOR SALE—The best buys in the United States. Three licensed OX5 Waco 90's, all have baggage compartments and compasses, one of them flown but 30 hours, priced from $1,400 up. One OX5 Travel Air 4 months old cannot be told from new, has Scintilla magneto. These ships are all in excellent condition and must be seen to be appreciated and priced to sell. Free flying instructions on any of these ships if necessary. Becker & Farmer Flying Service, Jackson, Mich.

New "SEARCHLIGHT" Advertisement

must be received by 10 A.M. Monday to appear in the issue of the following Saturday.
Address copy to the Searchlight Department
Aviation
Tenth Ave. at 36th St. New York City

FOR SALE

FOR SALE—Must dispose for financial reasons. Kinner K-A-1 condition, propeller, radiator, motor-mount and all fittings. First reasonable offer taken. FS-464, Aviation, Tenth Ave. at 36th St. New York.

FOR SALE. Two new Biplanes, two passenger side by side, dual controls. Velie motors, not licensed, built by one of the best engineers in this part of the country. Must sell as the corporation has dissolved. Bargain for someone. Swinson Motor Company, Pratt, Kansas.

FOR SALE. Waco Whirlwind. Bendix brakes. Gross struts landing gear, hand starter. Ship and motor like new. Licensed. Not cracked. 1929 N C 6930. Will accept Waco OX as part payment. J. W. Shallock, Owosso, Mich.

FOR SALE

FOR SALE. Stinson J 5 Junior 4-place. Hey wood starter. Ship and motor same as new. Privately owned. Licensed N C 8427. August first, 1929. Will accept Waco Whirlwind or OX on this. Price very attractive. J. W. Shallock, 207 No. Dewey Street, Owosso, Mich.

FOR SALE. 2 Ryan monoplanes with Wright engines, $8,000 each. 1 Cessna Wright engine $4,000. Travel Air with Hisso engine $2,000. Eaglerock OX 5 $1,000. 2 Isotta-Franchini 180 hp motors $300 each. 4 OX 5 motors $250. 1 Curtiss C-6 with Reed propeller $350. Lot of other miscellaneous equipment including 5 new Micarta propellers for Wright J 5, 3 parachutes etc., at lowest prices. All the above airplanes in good condition. Will sell complete our entire airplane equipment for $18,000. Mayer Aircraft Corporation, Bridgeville, Pa.

FOR SALE. OX-5 Eaglerock combination wing like new, licensed and always kept in hangar, will instruct buyer. W. J. Fritschle, 3305 Richert St. Louis Mo.

FOR SALE. Four brand new Curtiss Hammondsport OX-5 motors, complete in every respect. Attractive price. J. A. Field, 112 Boylston St., Bradford Pa.

FOR SALE—Waco Ten, licensed 150 hours, kept in hangar, OX5 motor just overhauled, looks like new. $1,800. O. O. Imm, Fergus Falls Minn.

(Continued on the following page)

FOR SALE

NEW TRAVEL AIR

J-6-7, 225 H.P.

$6,000.00

This ship, Model 4-D, flown only from the factory at Wichita to the Ford Airport, February 27th, is in perfect condition. Engine has had less than nine hours flying time. The list price on this plane is $8,640.00. It has ten hours' fuel capacity. All standard navigating equipment and Aerol landing gear. An unusual bargain.

Two Practically New

VERVILLE AIR COACHES

$3,250.00 Each

These ships with a total of less than 50 hours' flying, equipped with 110 H.P. motors, Heywood starters, adjustable stabilizers, Bendix wheels and brakes and Oleo landing gears, are ideally suited for private use. The richly upholstered cabin for three is comfortably arranged and fitted with dual control (side by side). Instruments include all standard engine gauges, bank and turn indicator and rate of climb indicator. Performance—fully loaded. Top speed 105 M.P.H., cruising speed 85 M.P.H., landing speed 45 M.P.H.

Address Inquiries to

GEORGE TABRAHAM
361 Merton Rd., Detroit, Mich

2 CURTISS SEA GULLS

Both 3 place licensed ships in perfect condition. Have had the best of care and always kept in hangar at night. Motors equipped with electric starters. Also extra motor for each plane. Prices $4,000 and $5,000.

Curtiss Air Station, Inc., Atlantic City, N. J.

FOR SALE

LOENING AMPHIBIAN

Sacrifice

New, March, 1929

Complete with Wright Cyclone, 525 H.P. Engine

Change of policy forces us to sacrifice reconditioned Loening. Motor latest type Cyclone.

Total time on engine less than 150 hours. Choice of any paint combination.

Price $16,000

If interested, write or wire for complete particulars

Westchester Airport
122 East 42nd St. New York City
Tel. Caledonia 8188
Field Armonk N. Y.
Tel. Armonk Village 300

FOR SALE

(Continued from preceding page)

FOR SALE—One Stinson-Detroiter 6 passenger whirlwind motored, equipped for night flying; one Waco Ten OX5 equipped for night flying; also shop office equipment; cash; wire or write. Wayne Flying Services, Ft. Wayne, Ind.

FOR SALE—One converted Ford "T" motor with 2 props and radiator, 9 hours since complete overhaul. In A1 condition. First sensible offer takes it. Philip Mitchell, 154 River St., Sanford, Me.

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WANTED—double pack exhibition parachute. EW-492, Aviation, Tenth Ave. at 36th St., New York.

WANTED—LeBlond, Kinner, Velie, J-4 and J-5 Wright Whirlwind motors and parts. The Detroit Aero Motors Co., 5055 to 6056 Townsend Ave., Detroit, Michigan.

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PILOT, dependable, 130 hours cross-country and passenger experience. Open and closed jobs. Will fly anywhere. Good references. PW-498, Aviation, 520 No. Michigan Ave., Chicago, Ill.

TRANSPORT pilot. Age 26. 300 hours cross country operating his own OXX-6 Travel Air on schedule time over most of United States in last year and half. Looking for steady connection. My ship is available. Arnold Bayley, 939 Fox Chase Road, Philadelphia, Pa.

TRANSPORT pilot wishes connection with reliable firm or individual. 2000 hours certified time, licensed airplane and engine mechanic. Available immediately. Can furnish the best of references. PW-496, Aviation, 520 No. Michigan Ave., Chicago, Ill.

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PW-447, Aviation
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LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Aviation, published weekly at New York, N. Y., April 1, 1930.

State of New York }
County of New York } ss.

Before me, a Notary Public in and for the state and county aforesaid, personally appeared C. H. Thompson, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Aviation, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Publishing Company, Inc., 10th Ave. & 36th St., N. Y. C. Editor, Edward P. Warner, 10th Ave. & 36th St., N. Y. C. Managing Editor, none. Business Manager, M. H. Newton, 10th Ave. & 36th St., N. Y. C.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) McGraw-Hill Publishing Company, Inc., 10th Ave. & 36th St., N. Y. C. Stockholders of which are: James H. McGraw, 10th Ave. & 36th St., N. Y. C. James H. McGraw, Jr., 10th Ave. & 36th St., N. Y. C. James H. McGraw, James H. McGraw, Jr., and Malcolm Muir, 10th Ave. & 36th St., N. Y. C., Trustees for Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw. Curtis W. McGraw, 2nd Seventh Ave., N. Y. C. Donald C. McGraw, 10th Ave. & 36th St., N. Y. C. Harold W. McGraw, 665 Madison Ave., N. Y. C. Joseph H. Bragdon, 10th Ave. & 36th St., N. Y. C. Anne Hugus Britton, 10th Ave. & 36th St., N. Y. C. Mason Britton, 10th Ave. & 36th St., N. Y. C. Edgar Kobak, 10th Ave. & 36th St., N. Y. C. Grace W. Mehren, c/o Bankers Trust Co., Fifth Ave. & 42nd St., N. Y. C. J. Malcolm Muir & Guaranty Trust Co. of New York, Trustees for Lida Kelly Muir, 140 Broadway, N. Y. C. F. S. Weatherby, 271 Clinton Road, Brookline, Mass. Edwin S. Wilsey, 10th Ave. & 36th St., N. Y. C. Goldman, Sachs & Co., 30 Pine Street, N. Y. C.

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McGRAW-HILL PUBLISHING COMPANY, INC.
C. H. THOMPSON, Secretary.

Sworn to and subscribed before me this 31st day of March, 1930.

[SEAL] H. E. BEIRNE,
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(My Commission expires March 30, 1931.)

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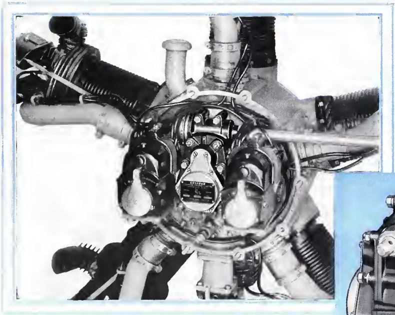
AVIATION
April 12, 1930



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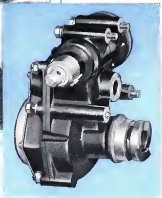

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